



ANNALEN

der

k. k. Sternwarte in Wien.

Nach dem Befehle

Seiner k. und k. apost. Majestät

auf öffentliche Kosten

herausgegeben

von

CARL von LITTROW,

Director der Sternwarte, o. ö. Professor der Astronomie an der Wiener Universität, k. k. Regierungsrath, Commandeur des kais. brasilianischen Rosen-, des kais. russ. St Annen- und des kais. osman. Medschidije-Ordens Ritter vom Dannebrog; Doctor der Philosophie; wirkliches Mitglied der k. Akademie der Wissenschaften zu Wien; Associate der R. Astronomical Society zu London; d. Z. Präsident der österr. Gesellschaft für Meteorologie; Mitglied der internationalen astronomischen Gesellschaft zu Leipzig, der Association scientifique de France, der kais. Leopoldinisch-Carolinischen Akademie der Naturforscher, sowie gelehrter Gesellschaften zu Sächsisch-Altenburg, Breslau, Castelfranco Cherbourg, Emden, Erfurt, Frankfurt a. M., Görlitz, Heidelberg, Jassy, Mainz, Padua Rom, Rovereto, Rovigo, Ulm, Upsala, Washington, Wien etc.

Dritter Folge

Zwanzigster Band.

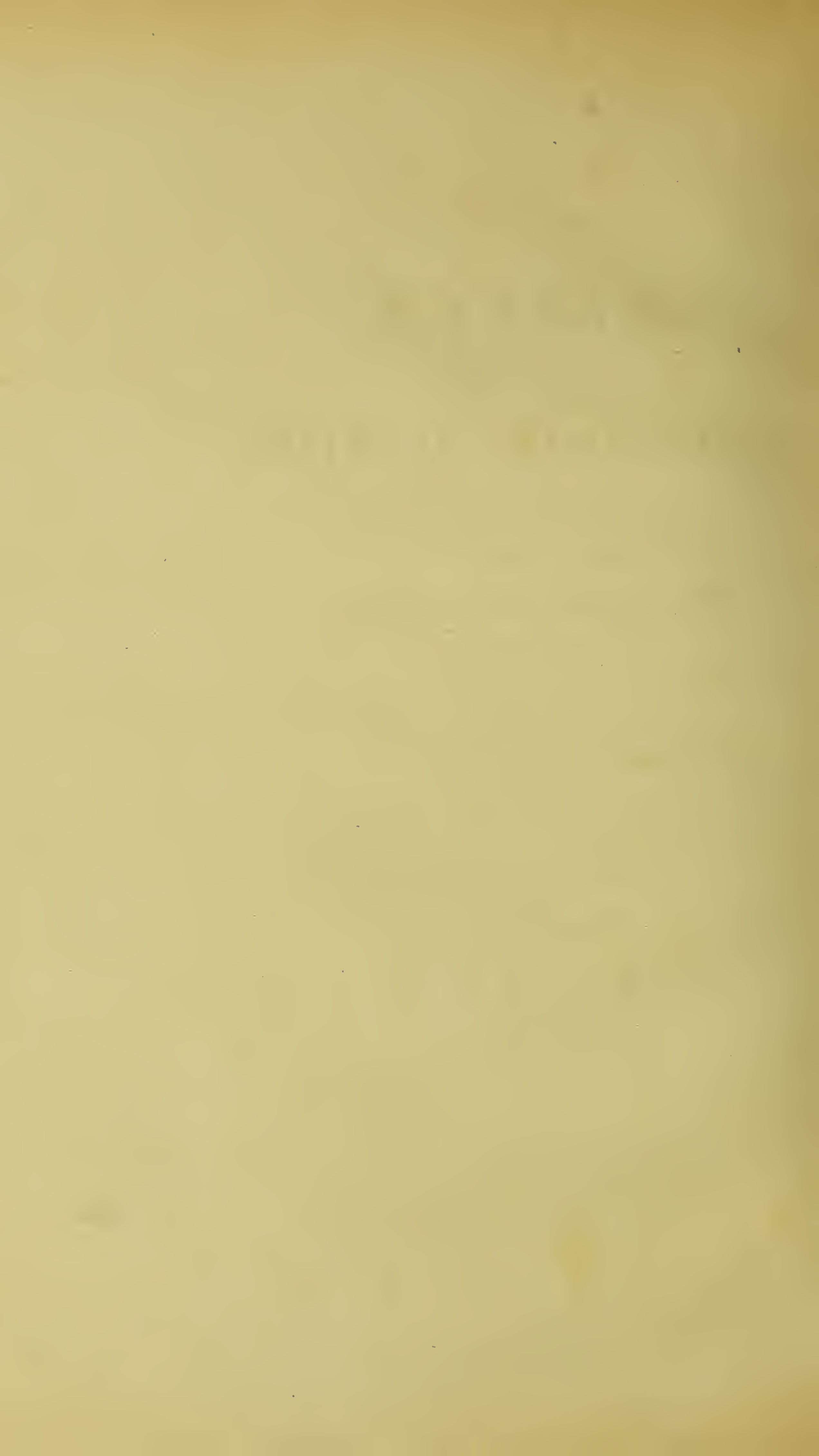
Jahrgang 1870.



WIEN, 1873.

Druck und Papier von Leopold Sommer & Comp. in Wien.

In Commission der Wallishausser'schen Buchhandlung (Jos. Klemm.)



Vorwort.

Die Beobachtung von Sternschnuppen, denen sich letztlich die Aufmerksamkeit der Astronomen in erhöhtem Masse zukehrte, hat auch unsere Anstalt, namentlich Hrn. Prof. E. Weiss, dem man schon so schöne Arbeiten auf diesem Gebiete verdankt, in den verflossenen Jahren vielfach beschäftigt und das Material sich nachgerade so angehäuft, dass wir es für zweckmässig hielten, den vorliegenden Band anschliessend der Publication solcher Beobachtungen und der betreffenden Reductionen sammt den dafür dienenden Hülfstafeln zu widmen.

Wien, den 4. November 1873.

C. v. Littrow.



STERNSCHNUPPEN-
BEOBACHTUNGEN,

AUSGEFÜHRT IN DEN JAHREN

1867—1870.

Zusammengestellt von

Prof. Dr. E. Weiss.





Die hohe Bedeutung, welche die Sternschnuppen in der jüngsten Zeit durch die Entdeckung des Zusammenhanges von Meteorströmen mit Cometen für die Astronomie gewonnen haben, veranlasste mich im Herbste des Jahres 1867 eine systematische Beobachtung dieser Phänomene an der hiesigen Sternwarte zu organisiren. Das Ziel, welches ich mir dabei steckte, bestand nicht so sehr darin, eine möglichst vollständige Kenntniss aller Meteorströme des ganzen Jahres zu erlangen, sondern vielmehr darin, eine möglichst genaue Detailuntersuchung einzelner derselben in Bezug auf ihren Charakter, ihre Dauer, ihren Connex mit anderen gleichzeitig auftretenden Sternschnuppenschwärmen etc. etc. zu erstreben. Dabei wurde auch auf correspondirende Beobachtungen ein besonderes Gewicht gelegt, nicht nur um die mittlere Höhe des Erscheinens und Verschwindens der Meteore einzelner Ströme kennen zu lernen, sondern auch, weil beim gleichzeitigen Auftreten mehrerer Radiationspunkte während einer sternschnuppenreichen Nacht diese Art von Beobachtungen fast allein sichere Aufschlüsse über die Zahl und Position der vorhandenen Radianten zu geben vermag

Die angewendete Beobachtungsmethode ist dieselbe, welche Dir. C. v. Littrow bei den von ihm in den Jahren 1837 bis 1841 auf der Wiener Sternwarte veranlassten Sternschnuppenbeobachtungen einführte. Sie besteht in der Beobachtung der Meteore, an »Meteoroskopen«, d. h. kleinen Theodoliten, welche mit leicht ablesbaren, nur von Grad zu Grad getheilten Kreisen versehen sind und statt des Fernrohres eine einfache Visurvorrichtung tragen, um Azimuth und Höhe des Anfangs- und Endpunktes einer Meteorbahn bequem einstellen zu können. Die Beobachtungen des Jahres 1867 sind auch noch mit denselben Meteoroskopen angestellt, welche zu den Sternschnuppenbeobachtungen in den Jahren 1837 bis 1841 verwendet worden waren. Doch schien mir nach den Erfahrungen in den ersten Beobachtungsabenden die nach dieser Methode erreichbare Genauigkeit im Pointiren der Meteorbahnen so gross, dass ich die Anwendung

präciserer Meteoroskope für wünschenswerth hielt, als es die ebengenannten alten. allerdings mit möglichster Sorgfalt, aber blos aus Holz verfertigten waren. Es liess daher auf mein Ersuchen Dir. v. Littrow durch den Mechaniker O. Schäffler mehrere Meteoroskope anfertigen, welche im Grossen und Ganzen wie die in den Annalen der Wiener Sternwarte I. Folge, 18. Band beschriebenen construirt, aber aus Metall gearbeitet sind. Um diese Meteoroskope auch an anderen Orten benützen zu können, wie es bei correspondirenden Beobachtungen nöthig ist, wurden gleichzeitig mehrere Holzstative angeschafft, ganz ähnlich denen, die zur Aufstellung von Messtischen verwendet werden.

Die Adjustirung der Meteoroskope wurde stets mittelst des Polarsternes vorgenommen und zu diesem Zwecke eine kleine Tafel entworfen, die von Stunde zu Stunde Sternzeit, Azimuth und Höhe desselben angibt. Beim Beginne der Beobachtungen wurde nun zunächst der Azimuthalkreis horizontal gestellt, dann am Meteoroskope Azimuth und Höhe des Polarsternes eingestellt, dasselbe hierauf um seine Hülse gedreht, bis das Diopterlineal auf den Polarstern hinwies, und endlich das ganze Instrument festgeklemmt. Dessen Aufstellung, von deren Stabilität man sich im Laufe der Nacht durch wiederholtes Einstellen auf den Polarstern überzeugte, wurde nun in den ersten beiden Beobachtungsjahren als fehlerfrei betrachtet und demgemäss keine weitere Correction an die Ablesungen von Azimuth und Höhe der Anfangs- und Endpunkte der Meteorbahnen, die in der Regel blos auf runde Grade geschahen, angebracht. Später, und zwar vom 11. August 1869 an, zogen wir es vor, beim Beginne der Beobachtung den Azimuthalkreis blos beiläufig einzustellen, seinen Indexfehler aus allen im Laufe der Nacht vorgenommenen Einstellungen des Polarsternes zu bestimmen und diesen, sowie den immer sehr kleinen Indexfehler des Höhenkreises, der sich dabei zugleich ergab, an die Beobachtungen anzubringen.

Azimuth und Höhe wurden mit Hilfe einer nach jeder dieser Coordinaten von Grad zu Grad fortschreitenden Tafel in Stundenwinkel und Declination verwandelt. Diese Tafel ist am Schlusse der Sternschnuppenbeobachtungen mitgetheilt und derselben ein Correctionstäfelchen beigegeben, welches die einer Aenderung der Polhöhe um Einen Grad entsprechenden Aenderungen der Rectascension und Declination enthält.

Bei den correspondirenden Beobachtungen bemühte ich mich stets nicht blos an zwei Orten Beobachtungen zu veranstalten, sondern um Wien, gleichsam als Centrum mehrere Stationen zu besetzen. Nebst anderen Vortheilen, die eine solche Anordnung bietet, vergrösserten

sich dadurch die Chancen für das Sehen identischer Meteore sehr erheblich, da es mir immer möglich war, für Wien mehrere Beobachter zu gewinnen und wir desshalb in Wien beinahe immer den ganzen Himmel gleichmässig bewachen konnten. Ferner wurde verabredet, um möglichst viele correspondirende Meteore und solche mit möglichst grosser Paralaxe zu erhalten, dass die Beobachter hauptsächlich die grösseren Höhen (über 30°) in's Auge fassen und vorzüglich nach der zwischen den anderen Beobachtungsorten liegenden Himmelsgegend hinsehen sollten: also z. B. bei der Augustperiode 1869 der Beobachter in Brünn, dem Wien südlich, Melk südwestlich liegt, nach SSW., von den Beobachtern in Wien, der eine nach NW. (Beobachter für Melk und Brünn), der andere nach SW. (Beobachter für Melk und Semmering), etc. Diese Anordnungen erwiesen sich als sehr zweckmässig und können daher für correspondirende Beobachtungen auf's Beste empfohlen werden.

Die regelmässige Ausführung correspondirender Beobachtungen während eines längeren Zeitraumes stösst bekanntlich auf bedeutende Schwierigkeiten, wenn zur Anstellung derselben die Beobachter immer erst von Fall zu Fall an die entsprechenden Orte geschickt werden müssen. Es lag mir daher sehr daran, für diese Art von Beobachtungen nach und nach an einigen Orten so zu sagen ständige Mitarbeiter zu gewinnen, und ich war in der That darin auch sehr glücklich, indem nebst anderen insbesondere die Herren Director Fr. Karlinski in Krakau, Professor Dr. G. Strasser in Kremsmünster, Professor Dr. R. Felgel in Brünn und N. v. Konkoly in O-Gyalla ihre Theilnahme an denselben zusagten. Diese Herren waren auch so freundlich die Veröffentlichung ihrer Beobachtungen im Zusammenhange mit den hiesigen zu gestatten.

Bei den ausserhalb Wien ausgeführten Beobachtungen habe ich die Beobachtungszeiten auf mittlere Wiener Zeit reducirt, um bei den correspondirenden Beobachtungen das Heraussuchen der identischen Meteore zu erleichtern. Dabei nahm ich die geographischen Coordinaten der Orte folgendermassen an:

Beobachtungsort	λ (östl. v. Paris)			φ		
Kremsmünster (Sternwarte)	11°	48′	3″	+ 48°	3′	24″
Melk (Stiftskirche)	12	59	49	48	13	46
St. Pölten (Militär-Akademie)	13	17	37	48	12	22
Semmering (Bahnstation)	13	29	36	47	38	8
Wiener-Neustadt (Militär-Akademie)	13	54	43	47	48	41
Wien (Sternwarte)	14	2	36	+ 48	12	36

Brünn (Technik)	14°	16′	30″	+ 49°	11′	39″
Troppau (Kioskhügel)	15	34	4	49	56	20
O-Gyalla (Privatsternwarte des Herrn N. v. Konkoly)	15	52	0	47	52	0
Krakau (Sternwarte)	17	37	24	+ 50	3	50

Nach diesen allgemeinen Bemerkungen erübrigt mir über die Anordnung des Druckes der ersten Partie von Meteorbeobachtungen, die hiermit zur Veröffentlichung gelangt, nur wenig mehr zu sagen. Ein in der dritten Columne der Grösse des Meteores angehängtes Sternchen zeigt, dass das Meteor zu den geschweiften gehörte; ein den Positionsangaben beigefügtes Ausrufungszeichen (!), dass der Beobachter die betreffende Pointirung für besonders sicher hielt, während ein Doppelpunkt (:) wie allgemein üblich als Zeichen der Unsicherheit gilt. Die vierte Columne enthält die Initialen des Namens des Beobachters, sie ist jedoch nicht ausgefüllt, sobald an einem Orte sich nur ein Beobachter befand, oder übersehen worden war, den einzelnen beobachteten Meteoren die Namen des Beobachters beizuschreiben, wie diess in den beiden ersten Jahren zuweilen geschah, z. B. gleich am ersten Beobachtungsabende (1867, Aug. 9.). Die Notirung der Beobachtungen besorgte in der Regel ich selbst, namentlich an allen Abenden, an denen correspondirende Beobachtungen angestellt wurden, um die mannigfachen Irrungen, welche in die Zeit und Positionsangaben sich einschleichen können, sobald mehrere Beobachter zugleich thätig sind, auf ein Minimum zu reduciren. Die übrig bleibenden Zwischenpausen benützte ich dazu, die allgemeinen Charaktere der verschiedenen Meteorschauer zu studiren, und stellte von den Meteoren, die ich sah, nur jene wenigen ein, deren Positionsangabe mir wichtig schien, die jedoch den anderen Beobachtern zufällig entgangen waren. Aus diesem Grunde habe ich mich nie als Mitbeobachter genannt, und nur in der Columne Beobachter den von mir beobachteten Meteoren den Anfangsbuchstaben meines Namens beigefügt. Wurde ein und dasselbe Meteor von zwei Herren eingestellt, so sind in der 4. Columne wohl beide genannt, in den folgenden Columnen aber nur das Mittel der Pointirungen angegeben. Diese Doppelbeobachtungen sind besonders zahlreich 1869, Juni 4. und 9., Juli 12. und 13., August 4., 11. und 13, und 1870, April 21. und 22. In diesen Nächten veranstaltete ich nämlich eine eigene Beobachtungsreihe, speciell zu dem Zwecke, die mittlere Unsicherheit der mit Hilfe eines Meteoroskopes erlangten Meteorpositionen abzuleiten. Die Discussion dieser Beobachtungen habe ich bereits an einem anderen Orte

veröffentlicht, *) doch will ich die Hauptergebnisse, zu denen sie führte, hier wiederholen, da mir dieselben in mancher Beziehung nicht ganz ohne Interesse scheinen. Sie lassen sich in folgende drei Sätze zusammenfassen:

1. Bei Meteorbeobachtungen treten zwischen den einzelnen Beobachtern persönliche Gleichungen (wenn man so sagen darf) auf, welche ganz den Charakter tragen, als ob die Meteore nicht gleichzeitig erscheinen und verschwinden würden, indem namentlich die Bahnlängen von verschiedenen Beobachtern auch verschieden angegeben werden.

2. Die Anfangs- und Endpunkte der Meteorbahnen werden mit Meteoroskopen nahezu gleich sicher beobachtet, und es beträgt der wahrscheinliche Einstellungsfehler, verbunden mit der persönlichen Gleichung, für jeden Endpunkt $\pm$ 2°.1. Die Richtung der Meteorbahnen wird jedoch in der Regel genauer angegeben, als diese Fehler vermuthen lassen.

3. Nach den Ergebnissen der mit Hilfe der Bessel'schen Methode ausgeführten Berechnungen correspondirender Beobachtungen zu urtheilen, erhält man beim Einzeichnen der Meteorbahnen in Sternkarten die Positionen der Anfangs- und Endpunkte ebenfalls beiläufig mit gleicher Genauigkeit, die jedoch der bei Beobachtungen mit Meteoroskopen nachsteht. Die einzige mir bekannte directe Vergleichung zwischen J. F. Schmidt und F. Thormann im November 1849 führt indess zu anderen Resultaten: es wäre daher sehr zu wünschen, dass die bei der Einzeichnung von Meteorbahnen in Sternkarten erreichbare Genauigkeit einer nochmaligen gründlichen Untersuchung unterzogen würde.

Zum Schlusse gereicht es mir noch zur angenehmen Pflicht, allen jenen Herren, welche mich bei der Anstellung der zeitraubenden und lästigen Meteorbeobachtungen unterstützten, meinen besten Dank hierfür auszusprechen. Die Namen derselben hier einzeln anzuführen, kann ich wohl unterlassen, da der Antheil, den jeder von ihnen an den Beobachtungen nahm, sich aus einem Blicke in die folgenden Blätter von selbst ergibt. Doch muss ich speciell hervorheben, dass die Herren J. Palisa, jetzt Vorstand der Marine-Sternwarte in Pola, und L. Schulhof, Assistent der hiesigen Sternwarte, sich um die Reduction der Beobachtungen besonders verdient gemacht haben.

Ed. Weiss.

*) Beiträge zur Kenntniss der Sternschnuppen (II. Abhandlung). Von Prof. Ed. Weiss. Sitzungsb. d. k. Akad. d. Wissensch. LXII. Bd., II. Abth.

Nr.	Mittlere Wiener Zeit		Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
					A	H	A	H	AR	Decl.	AR.	Decl.
	h	m			°	°	°	°	°	°	°	°

1867. August 9. Wien.

Beobachter: Prof. Felgel und Assistent Haag.

Nr.	h	m	Grösse	Beobachter	A	H	A	H	AR	Decl.	AR.	Decl.
1	11	13	3		232	42	213	40	26.1	+53.5	43.2	+65.2
2		22	1.2		145	35	124	25	204.4	+61.1	211.1	+40.8
3		26	1.2		139	41	117	38	220.8	+60.3	231.0	+44.3
4		29	2		156	51	125	51	239.4	+74.2	245.9	+55.1
5		31	3		217	51	209	55	20.0	+66.2	9.0	+70.9
6		34	3		209	39	204	41	54.5	+67.3	55.5	+71.5
7		36	1.2		179	45	136	32	144.5	+86.7	212.1	+53.3
8		47	3		17[illegible]	29	165	19	160.2	+69.3	162.5	+58.4
9		51	2		173	32	150	30	156.3	+73.0	198.0	+60.7
10	11	58	3		186	40	160	42	107.5	+80.7	210.9	+74.6
11	12	2	3		23[illegible]	34	238	33	49.1	+49.2	45.8	+44.6
12		3	3		165	60	145	54	287.9	+75.4	256.8	+67.5
13		4	3		182	15	182	12	135.4	+56.7	135.6	+53.7
14		9	1		157	34	161	35	108.9	+67.8	194.0	+70.8
15		12	1		139	49	167	45	248.2	+63.3	216.0	+80.5
16		13	3		219	53	213	50	25.4	+65.1	34.0	+68.6
17		18	2.3		154	31	150	32	200.8	+63.9	195.5	+54.5
18		18	2.3		171	28	169	21	164.7	+68.7	164.3	+61.5
19		18	2		207	39	19[illegible]	36	67.8	+68.6	102.1	+74.9
20		22	2		59	46	55	39	284.8	+17.3	283.1	+ 9.9
21		25	2.3		200	28	190	24	99.5	+64.6	122.5	+64.5
22		27	3		21	58	28	49	313.1	+17.6	306.5	+10.2
23		28	2.3		230	14	234	11	77.1	+36.6	75.9	+31.9
24		31	1		177	23	162	18	152.2	+64.7	177.7	+56.4
25		31	1		163	18	152	17	176.1	+56.8	191.7	+51.4
26		32	1		81	45	74	24	274.4	+27.0	263.6	+ 7.8
27		39	2		236	51	243	52	31.7	+54.5	27.8	+50.7
28		40	3		182	31	185	13	142.2	+72.7	139.6	+54.5
29		41	1*		157	9	133	28	217.6	+71.7	226.3	+48.7
30		44	3		21	23	16	22	308.8	-16.4	313.4	—18.3
31		45	2.3		190	28	165	48	124.6	+68.4	243.6	+80.0
32		45	1.2		200	39	189	34	84.7	+72.9	121.0	+74.3
33		46	2.3		254	31	238	19	48.0	+32.8	70.6	+35.2
34		50	3		21	65	33	11	320.9	+24.4	302.5	— 5.4
35	12	51	4		214	42	217	35	62.6	+65.5	72.7	+59.7

Nr.	Mittlere Wiener Zeit		Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
	h	m			A °	H °	A °	H °	AR. °	Decl. °	AR. °	Decl. °
36	12	54	1.2*		212	45	206	41	57.8	+68.0	73.2	+70.2
37		55	1		171	42	158	29	200.5	+81.1	201.1	+64.4
38		55	2		83	26	81	19	264.4	+14.7	261.0	+ 8.2
39		58	1.2*		221	61	210	68	18.2	+63.7	358.9	+65.2
40	12	59	3		165	18	158	16	179.9	+57.4	189.5	+53.1
41	13	2	2.3		74	59	67	47	297.3	+33.1	291.0	+21.6
42		2	2		245	30	254	28	59.1	+38.1	54.7	+30.8
43		5	3		74	40	75	29	282.7	+19.8	274.4	+21.1
44		8	3.4		161	22	148	18	191.8	+39.7	207.0	+50.2
45		9	3		77	52	68	44	291.5	+29.6	290.1	+19.8
46		10	2.3		235	21	236	15	77.3	+38.7	81.5	+33.6
47		11	3		151	18	168	21	203.8	+51.7	179.5	+61.2
48		12	2.3		237	16	248	18	80.3	+33.7	69.9	+27.9
49		12	1.2		141	30	128	16	228.8	+55.3	227.2	+36.9
50		14	1.2		243	66	194	68	14.1	+53.5	351.2	+69.0
51		14	2		161	27	166	20	198.2	+64.2	183.3	+59.6
52		15	4		40	20	37	16	298.4	−12.9	299.3	−17.8
53		15	3.4		151	28	145	28	215.1	+59.8	222.6	+56.3
54		16	2		65	54	64	43	300.6	+26.0	293.5	+17.2
55		18	2		129	36	106	14	248.6	+51.1	245.1	+21.1
56		18	3		124	19	108	18	234.7	+36.5	246.6	+25.2
57		19	3		62	42	55	41	294.8	+15.4	298.5	+11.6
58		20	4		70	24	69	19	278.4	+ 5.4	276.0	+ 0.9
59		22	2		34	39	36	29	312.7	+ 2.3	305.4	− 6.3
60		22	2.3		100	40	95	13	272.1	+34.6	253.7	+13.1
61		23	3.4		172	30	182	30	180.2	+70.8	153.1	+71.7
62		24	3		186	23	178	16	146.2	+64.4	162.6	+57.7
63		24	2		24	71	34	55	330.1	+30.5	319.4	+17.1
64		26	3		41	31	45	29	305.1	− 2.7	301.2	− 2.9
65		27	2.3		180	38	172	36	159.7	+79.8	188.4	+76.4
66		28	3		352	57	359	53	344.5	+15.4	340.6	+11.2
67		30	1*		332	76	12	61	348.5	+35.5	334.3	+19.7
68		31	2		122	20	113	16	240.5	+35.9	244.5	+27.2
69		31	3		359	35	3	27	341.6	− 6.8	337.9	−14.8
70		32	3.4		147	20	169	19	215.9	+51.3	181.9	+59.5
71		34	4		38	33	41	27	310.3	− 2.0	305.5	− 6.3
72		36	3		351	42	355	33	348.7	+ 0.5	346.2	− 8.7
73		40	2		111	27	101	22	257.4	+33.6	260.4	+23.4
74		41	3.4		157	28	158	18	212.9	+63.1	201.4	+54.9
75	13	42	2.3		168	43	162	39	226.1	+80.1	224.7	+74.1

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m			°	°	°	°	°	°	°	°
76	13 43	3		52	51	52	43	312.1	+18.8	307.5	+12.1
77	43	3		190	26	176	24	140.7	+66.5	172.6	+65.6
78	45	3		212	35	210	28	91.5	+63.0	104.5	+59.2
79	46	3		188	23	169	17	147.5	+64.0	184.4	+57.5
80	13 47	3		187	18	175	23	151.5	+59.3	175.5	+64.5

Vor dem Beginne der eigentlichen Beobachtungen wurden noch die folgenden drei Meteore eingestellt.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
81	10 11	2		195	56	215	61	334.6	+78.0	334.8	+66.5
82	17	3		180	36	168	29	112.1	+77.8	142.1	+68.7
83	10 51	4		205	50	210	48	15.0	+73.6	19.9	+70.1

Von den Meteoren kamen die meisten aus dem bekannten Radiationspunkte im Perseus, und vom Reste der grössere Theil aus einem sehr nördlichen, in der Nähe des Polarsternes gelegenen Punkte. In den späteren Nachtstunden trat auch ein Radiant in der Gegend von $\varkappa$ und γ Aquarii deutlich hervor. Gesehen wurde im Ganzen etwa die doppelte Zahl von Meteoren.

1867. August 10. Wien.

Beobachter Prof. Felgel und Assistent Haag.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	12 16	2	F.H	123	38	107	33	240.8	+48.2	245.7	+34.8
2	19	1	F	260	20	242	17	47.1	+21.3	63.1	+31.2
3	20	3	H	165	35	161	26	189 6	+72.7	184.6	+63.3
4	21	1.2*	H	125	38	95	21	240.7	+49.5	245.0	+18.8
5	25	2	F	248	35	256	34	43.7	+39.2	39.7	+33.4
6	28	1	H	149	21	138	17	199 4	+53.2	208.3	+43.8
7	31	3	H	129	17	121	15	217.8	+38.4	223.3	+31.7
8	34	2.3	H	125	26	114	19	230.4	+42.2	232.9	+30.0
9	39	2	F	191	20	190	18	127.3	+60.5	130.1	+58 7
10	39	2.3	H	127	18	99	13	222.5	+37 8	240.9	+15.8
11	41	1.2	F	182	51	168	46	353.3	+86.9	228.5	+81.5
12	41	1.2	H	183	46	165	35	105.3	+86.9	194.8	+72.7
13	43	3	H	151	35	144	27	218.8	+64.9	215.6	+55.0
14	45	1	F	191	20	190	18	128.8	+60.5	131.6	+58.7
15	47	1.2	H	99	45	88	30	269.8	+37.0	263.0	+20.6
16	51	1	F	41	56	34	38	308.7	+19.7	305.5	+ 1.3
17	51	2.3	H	98	18	86	13	248.2	+18.6	253.3	+ 7.0
18	52	3	F	54	55	52	46	301.7	+21.7	297.5	+14.6
19	53	2.3	H	101	44	98	25	269 2	+37.6	254.0	+23.5
20	12 56	3	H	181	40	165	39	147.7	+81.7	208.1	+75.8

Nr.	Mittlere Wiener Zeit		Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
					A	H	A	H	AR.	Decl.	AR.	Decl.
	h	m			°	°	°	°	°	°	°	°
21	12	59	1	F	25	20	29	16	308.9	—18.2	303.8	—20.8
22	13	0	1	F	46	35	51	26	297.8	+ 2.8	289.6	- 2.9
23		1	2	H	161	33	160	24	204.3	+69.2	194.5	+61.1
24		2	2	F	25	37	28	28	314.8	— 1.9	309.6	— 9.7
25		3	2	F	8	38	12	29	328.4	— 3.5	323.9	—12.0
26		5	2	H	130	39	115	28	249.7	+53.3	247.7	+36.8
27		6	2	H	160	31	151	18	204.3	+67.6	203.6	+51.7
28		6	1	F	7	40	10	37	330.1	— 1.6	327.5	— 4.3
29		7	1	H	148	45	118	27	249 4	+68.0	245.0	+38.2
30		7	2	F	345	28	353	21	349.3	—12.7	342.7	—20.5
31		8	3	H	226	44	215	29	56.1	+58.3	88.8	+57.1
32		9	1	F	59	41	42	31	307.7	+ 5.7	301.1	— 2.3
33		9	3	H	111	45	96	34	269.3	+44.1	266.7	+18.3
34		11	2	H	167	30	158	44	190.0	+69.3	239.4	+74.2
35		14	1	F	98	71	72	43	309.1	+47.3	289.3	+21.0
36		16	3	F	31	39	42	37	314.1	+ 1.5	305.4	+ 3.0
37		15	1	H	98	52	128	42	284.8	+40.1	157.8	+53.5
38		16	1	H	171	34	162	37	186.5	+74.3	214.2	+72.7
39		18	2	H	140	38	126	20	244.0	+59.4	234.9	+38 5
40		20	1*	F	18	36	22	28	324.5	— 4.3	319.3	—11.2
41		21	2.3	H	148	40	126	28	241.4	+65.8	243.4	+44.1
42		22	3	H	121	23	111	29	242.8	+37.4	255.7	+34.9
43		23	1	F	316	34	329	28	15.0	+ 1.2	7.2	— 8.9
44		25	1	H	120	45	80	40	269.1	+40.8	285.3	+23.0
45		28	3	H	237	43	245	56	56.6	+50.8	34.5	+50.9
46		28	1*	F	41	51	44	42	315.7	+15.3	309.5	+ 8.2
47		29	1	H	124	34	110	14	253.5	+46.5	245.9	+23.7
48		32	1	H	148	45	141	25	255.7	+68 0	228.9	+51.7
49		32	♀*	F	135	65	76	35	303.9	+61.0	285.7	+17.2
50		34	1*	H	102	38	93	25	273.0	+34.6	267.7	+20.3
51		36	1	F	53	24	55	18	296.0	— 3.7	291.2	— 7.7
52		37	1*	H	132	54	112	43	282.7	+60.0	276.0	+44.7
53		39	2	F	54	39	56	15	304.2	+ 9.5	289.5	— 9.6
54		39	1	F	5	46	10	38	340.3	+ 4.3	335.9	— 3.3
55		41	1	H	161	22	156	16	201.1	+59.7	204.0	+52.3
56		45	2	F	128	30	119	21	250.0	+46.7	248.5	+34.7
57		47	1.2	H	167	50	156	36	272.5	+81.4	230.0	+68.6
58		50	2	H	152	42	146	29	249.4	+69.4	232.5	+57.7
59		51	2	F	75	29	76	22	287.0	+12.1	281.7	+ 7.5
60	13	53	1	F	357	26	359	22	350 3	—15.8	348.5	—19.8

Nr.	Mittlere Wiener Zeit		Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
					A	H	A	H	AR.	Decl.	AR.	Decl.
	h	m			°	°	°	°	°	°	°	°
61	13	58	2	F	333	70	334	61	358 9	+29.8	1.7	+21.2
62	14	1	1	F	9	45	14	39	342.9	+ 3.5	338.5	— 1.9
63		4	2	F	165	36	155	24	217.6	+73.5	218 1	+58.8
64		5	1	H	186	32	183	28	152.5	+73.2	162.6	+69.7
65		9	1	F	10	41	15	30	343.7	— 0.4	338.0	—10.7
66		10	3	H	131	20	115	27	243.4	+41.8	263.1	+36.2
67		11	2	H	113	35	96	28	272.6	+39.9	277.3	+24.3
68		11	2.3	H	131	46	123	22	276.7	+57 2	252.6	+38.1
69		12	1	F	51	21	54	23	305.1	— 7.1	303.7	— 4 0
70		13	1	H	125	36	112	18	266.2	+48.4	258.4	+27.9
71		14	2	F	313	34	204	31	29.9	+ 2.4	117.1	+65.0
72		16	3	H	142	32	130	18	247.5	+57.2	244.1	+39.7
73	14	17	1	F	35	21	37	17	319.8	—14 1	316.3	—16.9

Nr. 38. Nach aufwärts gekrümmte Bahn.

Nr. 49. Sehr schönes Meteor von Venusgrösse mit einem lang anhaltenden bläulichen Schweife.

Es waren noch dieselben Radianten wie gestern vorhanden. Die Perseiden unterschieden sich von den Meteoren der anderen Radiationspunkte durch ihre schöne gelbe Farbe und dadurch, dass sie an Helligkeit vom Anfange an stetig zunahmen und im grössten Glanze verschwanden, und dass sie in der Regel einen rasch vergänglichen Schweif zurückliessen. Die Meteore des nördlichen Radiationspunktes (in der Nähe des Polaris) hatten meist eine weissliche Farbe, wenig intensives Licht, zeigten während ihres Laufes keine Helligkeitsänderungen und zogen mit einer so grossen scheinbaren Geschwindigkeit einher, dass sie oft nur den Eindruck phosphorischer Linien zurückliessen. Gesehen etwa die dreifache Anzahl von Meteoren.

1867. August 12 Wien.

Beobachter: Prof. Felgel und Assistent Haag.

Nr.	h	m	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	12	44	2	F	155	51	142	47	261.1	+73.6	253.6	+64.6
2	13	18	1	H	174	27	161	23	175.1	+68.4	198.2	+60.6
3		32	1	F	281	53	285	43	28.2	+31.8	33.9	+22.4
4		38	3	H	169	43	185	31	225.4	+80.7	151.2	+72.5
5		43	1	F	124	26	115	28	250.4	+41.5	259.2	+36.8
6		55	2.3	F	150	40	129	33	249 8	+67.1	257.0	+49.2
7	13	58	3	F	217	58	189	57	42.5	+66.2	18.8	+79.7
8	14	17	3	F	173	44	160	57	226.8	+83.6	308.8	+75.1
9		21	1.2	H	153	37	146	24	246.6	+67.4	236.4	+53.9
10		22	1.2	H	129	35	150	27	266.3	+50.5	235.1	+58.5
11		35	1	H	179	45	166	28	192.3	+86.7	212.9	+67.1
12		43	1	H	128	33	132	24	269.8	+48.6	256.5	+45.3
13		43	1	W	222	54	205	42	63.2	+63.4	101 9	+71.4
14		44	1	H	62	44	59	49	320.4	+17.0	325.2	+19.7
15	14	45	1	F	71	41	61	38	313.2	+19.0	317.4	+11.7

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl	Ende AR.	Ende Decl.
	h m			°	°	°	°	°	°	°	°
16	14 52	2.3	H.F	210	33	207	25	117.1	+62.9	131.9	+58.6
17	56	2.3	H	145	25	125	21	247.5	+54 1	263.2	+38.7
18	14 56	1.2	H	173	29	155	19	203.2	+70.1	228.4	+54.6
19	15 1	1.2	H	167	35	162	31	227.1	+73.7	231.3	+68.1

Nr. 4. Dauer 1^{s}5.
» 5. Sehr langsam. Dauer 2^s.
» 8. Nach aufwärts gekrümmte Bahn.
» 9. Intermittirend.
» 10. Gelbroth.
» 12. Bläulich.

1867. August 19. Wien.

Beobachter: Assistent Haag.

Nr.	Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl	Ende AR.	Ende Decl.
1	11 1	3		158	45	144	30	219.2	+74.6	202.6	+57.1

Trotz heiteren Himmels in der folgenden halben Stunde kein weiteres Meteor gesehen, daher die Beobachtung geschlossen.

1867. August 27. Wien.

Beobachter: Prof. Felgel.

Nr.	Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl	Ende AR.	Ende Decl.
1	9 23.8	1*		250	42	224	27	6.4	+42.0	42.4	+49.9
2	28.1	2		175	35	172	20	135.1	+76.3	133.3	+61.1
3	37.1	2		168	50	139	67	227.2	+82.0	266.9	+62.0
4	9 46.1	2.3		156	23	145	18	167.7	+58.5	177.7	+48.6
5	10 0.1	3.4		122	32	136	30	217.1	+44.0	203.3	+52.0
6	10 25.1	4.5		187	40	177	24	97.9	+80.4	138.6	+65.7
7	11 14.1	3		251	42	235	26	33.4	+41.4	61.3	+42.2
8	16.1	1.2		99	35	135	13	254.2	+30.9	206.9	+38.8
9	28.1	1		157	55	169	50	271.9	+74.3	255.8	+82.6
10	32.1	3.4		165	30	182	37	186.3	+68.5	140.5	+78.7
11	34.1	1		128	38	135	29	243.6	+51.5	226.6	+50.7
12	47.1	2		166	47	172	41	240.3	+80.5	193.5	+80.8
13	51.1	1.2		151	55	137	32	275.1	+70.9	232.7	+54.0
14	55.1	3.4		189	30	181	21	130.4	+70.5	152.4	+62.8
15	56.1	4		225	55	217	49	33.8	+61.8	48.8	+65.8
16	11 59.1	2		179	45	203	36	168.0	+86.7	92.7	+69.2

Nr. 1. Sehr schönes, bläuliches Meteor mit lang andauerndem Schweife.
» 9. Blendend weisses, sehr langsam einherziehendes Meteor.
» 11 Sehr rasch.
» 16. Bewegung langsamer werdend.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.

1867. August 30. Wien.

Beobachter: Assistent Haag.

Nr.	Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m			°	°	°	°	°	°	°	°
1	8 44	2		174	44	167	33	156.3	+84.1	146.9	+71.9
2	9 18	2		244	32	226	23	22.3	+40.0	46.1	+45.9

Nr. 1. Gegen Ende an Glanz zunehmend.
Wegen Seltenheit der Meteore die Beobachtungen um $9\frac{1}{4}^h$ geschlossen.

1867. September 1. Wien.

Beobachter: Prof. Felgel.

Nr.	Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	10 11.1	3		222	63	224	55	354.8	+62.8	12.5	+62.4
2	10 55.1	4		237	59	220	55	14 3	+55.7	23 7	+64.6
3	11 4.1	2		258	30	264	31	43.3	+29.5	38.7	+26.4

Nr. 3. Schwach gekrümmte Bahn.
Bis 11^h 45^m kein weiteres Meteor mehr gesehen, daher Beobachtung geschlossen.

1867. September 3. Wien.

Beobachter: Assistent Haag.

Nr.	Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	10 33	3		242	46	220	27	29.7	+48.9	70.7	+52.5
2	46	3.4		162	42	142	11	214 6	+75.9	197 5	+41.2
3	10 55	3		221	47	163	25	43.2	+62.7	117.9	+64.7

1867. September 20. Wien.

Beobachter: Prof. A. Weiss, Prof. Felgel und Assistent Haag.

Nr.	Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	9 7.3	2	W	141	26	150	18	204.1	+52.4	185.5	+51.2
2	9.3	3	W	171	24	167	16	156.2	+64.8	159.4	+56.1
3	23.4	2	W	37	37	42	34	291.3	+ 1.3	286 4	+ 0.4
4	28.4	3	F	26	43	33	40	302 6	+ 4.1	296.7	+ 2.9
5	49.4	3	F	228	22	235	15	73 7	+43.9	73.5	+34.3
6	52.4	2	F	2	32	22	46	325.7	— 9.8	312.2	+ 6.1
7	9 53.4	4	H	95	43	125	30	266.7	+33.4	234.6	+44 8
8	10 6.4	4	H	110	40	108	39	258.9	+40.9	258.9	+39.0
9	11.4	4.5	H	92	45	76	30	274.7	+32.9	272.3	+13.5
10	14.4	3	H	87	30	73	23	265.8	+20.0	270.6	+ 6.4
11	10 35.4	3.4	H	145	45	139	23	253.6	+66.0	225.1	+49.0

Nr. 10. Heller werdend.
Die Beobachtungen kurz nach $10\frac{1}{2}^h$ beim Aufgange des Mondes geschlossen.

1867. October 2. Wien.

Beobachter: Prof. A. Weiss, Prof. Felgel und Assistent Haag.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m			°	°	°	°	°	°	°	°
1	11 2.7	1	F	172	32	131	19	200.1	+72.7	247.8	+41.1
2	11.7	1	F.H	160.5	14	180.3	75	210.9	+52.2	178.3	+49.3
3	17.7	3.4	W	135	21	80	29	249.6	+45.1	297.5	+15.1
4	11 35.7	2.3	H	120	38	99	16	284.7	+46.2	279.5	+17.9

Nr. 2. Sehr helle, langsame, am Ende der Bahn röthlich werdende Sternschnuppe. Die Beobachtungen wurden um 9^h 45^m begonnen und um 11^h 45^m geschlossen. In der ersten Beobachtungsstunde kein einziges Meteor gesehen.

1867. October 23. Wien.

Beobachter: Palisa und Assistent Haag; zeitweilig auch Prof. Felgel.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	8 23.7	3		130	19	124	15	239.5	+47.4	231.7	+33.6
2	26.7	3		183	58	176	58	347.6	+80.0	326.2	+79.9
3	30.7	2		142	62	104	61	296.7	+64.8	295.9	+46.9
4	32.7	3		154	50	156	45	265.5	+73.0	247.6	+73.3
5	35.7	2		21	43	30	29	325.5	+ 3.1	314.5	— 8.3
6	36.7	2		105	45	107	33	277.0	+40.5	263.6	+34.8
7	41.7	3		171	22	149	14	178.8	+63.0	209.7	+47.3
8	43.7	3		198	43	171	34	88.5	+76.4	191.2	+74.3
9	49.7	2		193	60	199	52	11.9	+76.0	49.8	+77.3
10	51.3	2		115	37	107	35	266.4	+42.2	269.3	+36.0
11	53.7	3		140	50	126	42	274.3	+64.1	266.4	+52.2
12	8 58.7	3		32	31	27	26	319.2	— 5.7	321.7	—11.9
13	9 0.7	2		232	85	352	56	353.2	+51.2	351.5	+14.1
14	10.7	2		245	67	215	63	25.3	+52.8	28.9	+65.8
15	11.7	2		285	48	294	41	35.7	+26.0	35.7	+16.5
16	22.7	3		295	61	287	65	23.3	+31.0	22.5	+36.4
17	37.7	3		176	30	168	25	187.2	+71.6	202.6	+65.0
18	47.7	2		155	38	145	27	248.6	+69.3	243.4	+55.6
19	48.7	1*		249	41	70	76	70.4	+42.1	341.0	+41.9
20	9 53.7	2.3		202	33	186	30	124.9	+67.6	163.9	+71.3
21	10 3.7	3		78	72	81	52	338.8	+41.8	317.1	+31.5
22	6.7	2		92	20	96	16	285.6	+16.1	279.9	+15.8
23	10 13.7	2		196	37	202	28	133.1	+73.8	137.1	+63.6

Nr. 2 Sehr schnell.
» 18 gekrümmte Bahn. Ebenso Nr. 21.
» 19 Langsam.
Um 10^h 15^m trat eine rasche Bewölkung des Himmels ein.

Nr.	Mittlere Wiener Zeit		Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
					A	H	A	H	AR.	Decl.	AR.	Decl.

1867. October 24. Wien.

Beobachter: Palisa und Möller; auf kurze Zeit auch Assistent Haag.

Nr.	h	m	Grösse	Beobachter	A °	H °	A °	H °	AR. °	Decl. °	AR. °	Decl. °
1	7	31.7	2	P	208	37	216	30	74.0	+66.7	76.0	+57.1
2		34.2	2	P	299	80	278	75	338.2	+43.6	347.2	+44.1
3		34.7	2	M	155	35	145	35	210.1	+67.3	222.4	+61.1
4		36.7	3.4	P •	269	55	256	51	13.7	+38.2	23.3	+43.0
5		37.7	2	P	275	56	288	46	10.5	+35.8	13.0	+23.2
6		39.7	3	P	209	30	192	32	87.9	+61.3	114.0	+71.4
7	7	49.7	3.4	W	50	36	32	25	291.6	+ 5.3	300.8	—11.4
8	8	2.7	2	P	239	42	223	50	49.2	+49.0	43.4	+62.2
9		3.7	3.4	P	215	29	215	24	86.4	+57.1	92.2	+53.3
10		10.7	2	P.M	208	43	78	37	69.9	+69.8	279.2	+19.8
11		14.7	3	W	32	43	30	30	313 5	+ 5.5	310.5	— 7.3
12		18.7	2	P	235	27	240	22	73.5	+42.9	74.2	+36.0
13		21.7	3	P	166	61	242	54	311.2	+74.9	35.4	+51.8
14		29.7	2	P	192	32	195	25	126.5	+71.4	127.8	+64.0
15		35.7	3	P	288	59	291	69	17.0	+32.3	6.6	+37.6
16		42.7	3	P	244	61	225	67	29.2	+52.5	17.6	+60.5
17		49.7	2	P	216	27	217	14	99.3	+55.0	110.7	+44.2
18		54.7	2	P	210	22	211	14	113.3	+54.5	118.9	+47.3
19	8	57.7	2	M	204	30	202	24	113.3	+64.2	123.7	+60.2
20	9	0.7	3	P	225	52	227	44	53.2	+61.4	67.4	+57.7
21		3.7	2	P	244	25	255	20	79.7	+35.5	75.7	+24.7
22		14.7	2	P.M	208	40	201	26	93.4	+68.4	127.3	+62.4
23		20.7	2	P	277	62	285	64	29.4	+38.3	24.7	+36.4
24		24.7	2	P	229	33	219	23	88.2	+50.6	109.1	+50.2
25		25.7	3	P	185	29	184	25	161.0	+70.5	165.0	+66.6
26		27.7	2	M	224	16	218	14	111.1	+41.8	119.1	+43.6
27		30.7	2	M	227	21	220	18	104.4	+43.9	114.3	+45.7
28		39.7	3	P	272	31	273	46	64.6	+21.3	51.6	+30.8
29		49.7	3	P	149	21	141	13	233 6	+53.2	236.1	+42.3
30		50.7	3	P	120	40	118	25	282.5	+47.3	267.9	+36.8
31		52.7	3	P	166	31	153	30	217.7	+69 8	239.3	+62.5
32		52.7	2	P	165	55	147	41	312.7	+78.5	266.1	+65.7
33		57.2	3	P	249	47	242	46	66.6	+45.1	71.0	+48.9
34	9	58.7	2	P	132	31	127	24	264.9	+50.0	261.7	+42.1
35	10	2.7	2	M	10	17	20	9	352.9	—24.2	340.4	—30.1

Nr.	Mittlere Wiener Zeit h	m	Grösse	Beobachter	Anfang A	H	Ende A	H	Anfang AR.	Decl.	Ende AR.	Decl.
	h	m			°	°	°	°	°	°	°	°
36	10	10.7	2	M	180	44	182	30	185.4	+85.8	179.8	+71.7
37		13.7	3	W	354	43	25	36	10.6	+ 1.4	346.2	− 2.9
38		15.7	3	W	229	37	225	33	95.7	+53.0	104.3	+53.3
39		16.7	2	M	264	47	235	45	64.3	+36.4	80.6	+52.9
40		21.7	2.3	H	93	26	85	21	294.2	+21.0	296.0	+12.2
41		24.7	2	P	232	30	220	23	104.4	+46.7	123.1	+49.6
42		27.7	2	H	2	35	261	14	8.0	− 6.8	96.8	+16.5
43		28.7	2	M	290	46	312	51	54.8	+22.2	39.4	+17.4
44		31.7	2	M	25	63	41	30	358.6	+23.0	335.9	− 3.6
45		34.7	2	W	236	67	217	47	47.2	+56.3	90.3	+65.3
46		36.7	2	W	114	20	126	18	278.2	+30.7	266.7	+37.1
47		43.7	2	W	233	52	225	43	76.9	+56.6	96.1	+58.5
48		44.7	1	P	188	18	185	12	179.0	+59.1	185.7	+53.5
49		46.7	3	P	209	19	207	15	145.5	+52.6	151.4	+50.1
50		47.7	3.4	H	166	27	181	14	226.9	+66.2	192.9	+55.8
51		49.7	2	P	284	41	280	29	67.2	+21.5	78.3	+15.1
52		57.7	2	M	60	34	55	27	330.7	+ 8.1	330.3	− 0.2
53	10	59.7	2	P	75	32	68	25	319.9	+14.4	320.2	+ 5.1
54	11	3.7	2*	P	165	23	154	17	229.4	+62.2	241.9	+52.3
55		7.7	2.3	P.H	185	32	188	22	184.8	+73.4	183.1	+63.0
56	11	8.7	2.3	M	150	27	150	29	258.5	+58.5	261.0	+60.0
57		9.7	2	P	293	55	285	47	56.8	+27.5	67.0	+25.3
58		13.7	2	M	344	79	30	64	25.0	+37.6	7.2	+24.6
59		14.7	2	P	261	28	261	37	97.9	+26.3	90.2	+32.2
60	11	20.7	2.3	P	219	35	215	43	133.1	+58.4	121.9	+65.2

Nr. 5, 21, 23, 24, 28, 44 und 53 gekrümmte Bahnen.
» 6 Mehrfach aufleuchtend.
» 10 und 59 geschlängelte Bahn.
» 31 sehr schnelles Meteor.
» 42 Gegen Ende intermittirend.
» 51 Aeusserst stark gekrümmte Bahn; ging durch Az. = 285° H. = 33°.
Ausser den beobachteten wurden noch ziemlich viele Sternschnuppen gesehen.

1867. October 25. Wien

Beobachter: Palisa und Möller.

Nr.	h	m	Grösse	Beobachter	Anfang A	H	Ende A	H	Anfang AR.	Decl.	Ende AR.	Decl.
1	7	49.8	3	P	154	50	146	39	256.9	+73.0	233.1	+64.0
2		56.8	3	P	165	51	170	41	264.6	+79.9	201.0	+79.9
3		56.8	3	M	145	29	140	26	220.1	+57.1	221.9	+51.8
4	7	57.8	3	.	166	53	173	38	276.7	+79.9	182.2	+78.6
5	8	2.8	1	.	203	39	178	27	85.0	+71.1	159.1	+68.7

Nr.	Mittlere Wiener Zeit		Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
					A	H	A	H	AR.	Decl.	AR.	Decl.
	h	m			°	°	°	°	°	°	°	°
6	8	3.8	2	M	220	67	196	67	7.3	+62.3	352.6	+69.5
7		4.8	3	M	243	56	246	59	28.9	+51.9	23.6	+51.1
8		5.8	3	P	195	55	187	47	23.3	+78.5	76.9	+85.2
9		12.8	2	P	120	26	112	27	243.8	+38.8	250.6	+34.2
10		13.8	3	.	119	62	100	67	292.7	+54.0	302.8	+47.0
11		15.8	4	W	116	53	109	40	279.4	+50.5	266.2	+40.3
12		27.8	3	W	114	59	116	49	292.0	+51.1	276.8	+48.9
13		29.8	2	M	241	39	248	23	59 7	+46.2	71.0	+31.4
14		30.8	3	P	79	37	85	23	284.6	+20.3	270.6	+13.7
15		34.8	3	M	221	48	228	34	57.3	+63.0	76.2	+51.8
16		50.8	3	P	100	34	99	21	274.4	+30.9	264.4	+21.4
17		54.8	1	P.M	229	65	152	52	26.2	+59.3	279.9	+71.8
18	8	57.8	2	P	176	35	105	24	182.4	+76.5	199.7	+63.1
19	9	9.8	2	P	67	60	52	39	318.7	+31.0	312.9	+ 8.7
20		17.8	2	.	115	41	109	26	279.5	+44 6	268.2	+31.5
21		23.8	2	W	108	25	100	21	269.5	+30.1	272.0	+22.0
22	9	33.8	2.3	.	176	44	174	36	212.0	+84.9	199.3	+77.0

Nr. 1, 2, 4 und 11 sehr schnelle Meteore.
Beobachtung durch Höhennebel beeinträchtigt.
Um $9\frac{1}{2}^h$ trat rasche Bewölkung ein.

1867. October 27. Wien.

Beobachter: Palisa.

Nr.	h	m	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	7	48.8	1*		205	33	180	25	92.8	+65.9	152.9	+66.8
2		52.8	2		245	44	241	38	44.0	+46.1	53.6	+45.6
3	7	54.8	2.3		263	44	257	45	35.3	+35.2	37.3	+39.3
4	8	0.8	3		227	40	229	30	61.9	+55 9	73 7	+48.7
5		9.8	2		245	53	231	57	36.0	+49.9	32.5	+58.7
6		12.8	2		288	48	301	56	23.3	+24.6	11.0	+25.2
7		17.8	2.3		215	35	205	31	84.1	+61.1	103.2	+64.5
8		28.8	2		223	52	204	39	48.6	+62.6	92.1	+70.5
9		29.8	2.3		162	20	154	15	196.6	+58.3	204 8	+50.5
10		36.8	3		188	20	182	15	149.2	+61.1	161.4	+56.7
11		41.8	2		218	66	180	64	20.1	+63.4	346.1	+74.2
12	8	58.8	3		228	66	281	78	23.5	+61.5	4.6	+44.6
13	9	12.8	2		93	34	91	20	286.2	+26.5	276.8	+15.5
14		15.8	2		341	30	28	26	11.4	— 9.9	329.1	—11.6
15		17.8	3		281	44	285	39	46.5	+25.2	48.1	+19.6

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m			°	°	°	°	°	°	°	°
16	9 21.8	3		231	64	248	62	37.1	+58.6	39.8	+50.8
17	32.8	1*		217	34	222	19	102.5	+59.1	114 8	+45.4
18	40.8	3		223	42	217	36	86.3	+59 4	101.3	+60.3
19	42.8	3		233	47	225	38	73.0	+55.0	91.9	+56.1
20	48.8	1		171	19	168	10	200.1	+59.9	201.7	+50.5
21	9 54.8	1*		297	32	322	37	54.2	+ 8.0	33.9	+ 1.6
22	10 8.8	2.3		116	41	112	32	193.6	+45.2	286.3	+37 4
23	12.8	3		225	29	220	21	111.5	+50.7	125.0	+48.1
24	10 39.8	2		240	50	253	39	79.7	+51.7	87.1	+38.4

Nr. 1, 9, 17, 20 und 21 langsame Meteore
" 8 gekrümmte Bahn; ging durch Az. = 209' H. = 45°.
" 11 schnelles Meteor.
Die Beobachtungen wurden um 10^h 55^m geschlossen.

1867. October 29. Wien.

Beobachter: Palisa und Möller.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	6 48.9	3		354	24	355	30	325.6	—17.6	324.2	—11.7
2	6 51.9	2		197	50	183	37	35.1	+78.7	128.4	+78.6
3	7 4.9	1		199	54	158	44	20.8	+76.8	226.5	+74.2
4	5.9	2		196	59	215	56	359.2	+75.7	20.8	+67 3
5	10.9	2.3		191	36	173	34	107.7	+75.3	168.0	+74.9
6	13.9	3		176	53	164	58	299.6	+84.6	287.9	+76.3
7	26.9	2		255	26	258	21	51 5	+28.9	53.4	+23.4
8	27.9	2		280	63	283	52	4.1	+37.8	13.3	+29.6
9	29.9	3		242	41	237	35	45.6	+46.5	56.0	+46.5
10	34.9	3		219	23	223	15	86.5	+50 2	89.5	+41.6
11	7 35.9	2		210	18	207	10	102.2	+51.3	111.9	+45 6
12	8 0 9	2		228	14	231	9	92.0	+37.8	93.0	+32.1
13	6.9	3		114	49	115	33	276 2	+47.7	256.8	+40.0
14	18.9	2		254	36	248	29	55.2	+36.0	66 9	+35.5
15	20.9	2.3		239	24	228	31	78.7	+38.1	80 4	+50.0
16	22.9	3		223	61	205	61	29.5	+62.7	22 2	+70.9
17	41.9	1*		282	46	315	42	38.0	+26.1	21.1	+ 8.5
18	41.9	3		231	47	229	40	62.9	+56 3	75.1	+54.5
19	8 53.9	3		9	38	9	32	344.0	— 3.4	343.3	— 9.4
20	9 0.9	2		234	28	225	25	88.8	+44 1	99.9	+47.9

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m			°	°	°	°	°	°	°	°
21	9 1.9	3		39	45	44	38	326.3	+ 9.3	319.8	+ 4.7
22	3.9	2		309	56	317	69	21.7	+22.6	13.3	+27.1
23	6.9	2		235	73	206	70	19.5	+55.0	15.1	+64.9
24	17.9	2		279	50	306	45	44.4	+30.3	33.4	+14.5
25	18.9	1		152	36	149	26	247.0	+66.1	236.0	+57.2
26	21.9	3		266	35	283	34	65.6	+27 8	55.8	+17.0
27	25.9	2		239	15	230	10	102.5	+31 7	114.4	+53.5
28	27.9	1.2*	P.M	234	37	203	44	85.1	+49.6	95.9	+73.6
29	31.9	1.2		151	50	134	55	286.9	+71.1	301.7	+61.2
30	33.9	2	P.W	200	31	196	26	132.3	+67.1	146.0	+64.5
31	34.9	3		261	39	259	35	68.2	+33.4	73.1	+32.2
32	35.4	2		266	38	258	35	66.3	+29.7	73.8	+32.8
33	47.9	3.4		208	38	201	36	111.1	+67.3	125.3	+70.4
34	48.9	1.2*		191	51	166	64	69.4	+82.4	344.3	+72.5
35	9 50.9	2		268	56	250	54	51.5	+39.1	60.3	+47.5
36	10 9.9	1		254	61	246	43	54.2	+47.8	81.0	+44.9
37	14 9	2.3		229	44	226	49	89.8	+56.4	82.2	+60.0
38	15.9	1.2		298	45	186	32	52.7	+17.8	173.9	+73.2
39	25.9	2.3		334	46	339	35	32.1	+ 6.9	31.4	— 4.6
40	30.9	3		10	59	54	65	11.3	+27.5	352.0	+30.6
41	34.9	1*		316	32	343	36	52 5	— 0.6	30 1	— 4.5
42	38.9	2		287	53	274	45	58.4	+28.5	71.6	+29.7
43	10 39.9	3		262	49	247	58	73.9	+38.6	67.7	+50.3

Nr. 3 geschlängelte Bahn.
» 23 gekrümmte Bahn.
» 24 stark gekrümmte Bahn; Mitte der Bahn Az. = 288° H. = 42°.
» 28 Farbe röthlich.
» 41 schönes Meteor von Jupitergrösse.
Wegen eingetretener Bewölkung die Beobachtungen um 10^h 50^m geschlossen.

1867. November 1. Wien.

Beobachter: Palisa und Möller

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	8 8	3		112	53	99	18	285.7	+48.2	284.9	+38.6
2	11	3		165	41	158	37	223.8	+77.2	226.6	+70.5
3	12	3		267	52	240	47	34.5	+37.5	52.0	+50.6
4	22	1*		144	44	121	46	260.0	+64.9	275.4	+50.9
5	8 28	3		155	54	145	56	287.3	+73.4	290.9	+67.5

Nr.	Mittlere Wiener Zeit		Grösse	Beobachter	Anfang		Endeg		Anfang		Ende	
					A	H	A	H	AR.	Decl.	AR.	Decl
	h	m			°	°		°	°	°	°	°
6	8	36	3.4		129	56	110	56	293.3	+58.5	297.5	+48.2
7		41	2.3		108	45	109	33	285.4	+42.3	272.2	+36.1
8		44	1.2		79	36	76	21	294.1	+19.6	285.9	+ 6.7
9		48	3.4		294	68	307	69	17.7	+36.1	12 7	+33.5
10		51	1		70	49	75	36	310.6	+24.4	298.3	+17.3
11	8	56	2		195	34	195	24	30.8	+71.9	43.1	+63.1
12	9	1	3		286	69	302	58	22.1	+39.1	26.0	+26.4
13		6	4		301	52	315	48	31.8	+22.1	26.3	+13.8
14		7	2		282	22	275	19	63.8	+ 8.7	70.9	+10.8
15		10	1.2		320	45	320	37	25.6	+ 9.6	29.0	+ 2.3
16		18	2.3		135	71	137	57	333.4	+59 2	305.2	+63.0
17		18	2		252	78	168	68	18.3	+50.5	337 4	+69.3
18		26	1*		70	72	70	57	340.0	+39.7	323.3	+32.6
19		27 5	2		311	23	312	16	46.8	— 6.4	49.6	—12.9
20		38	2.3		235	63	218	66	48.1	+56.9	39.1	+63.4
21		42	2		191	43	193	27	126 2	+80.7	156.0	+66.6
22		55	3		292	30	296	21	63.8	+ 9.0	66.4	— 0.3
23		58	2.3		151	23	151	16	242.9	+55.9	236.6	+50.0
24	9	59.5	3		265	51	251	48	63.3	+38.1	72.8	+44 4
25	10	7	1		4	45(:)	359	34	9.6	+ 3.3	13.3	— 7.8
26		7.3	2		298	43	290	49	54.8	+16.2	55.2	+24.4
27		8	2		331	42	336	35	33.7	+ 3.8	32.1	— 4.0
28		8.4	3		160	41	157	27	263.1	+74.1	241.2	+62.3
29		21	3.4		252	70	212	79	46.6	+50.4	26.7	+57.2
30		21.5	2		125	46	125	27	303.9	+53.3	280.0	+42.9
31		22	3		280	43	289	45	68 8	+25.1	62.4	+22.0
32		25	3		297	69	310	56	40.2	+36.0	44.5	+22.3
33		26	3		205	13	174	10	158.2	+49.2	206.7	+51.4
34		31	2.3		333	46	340	41	37.0	+ 7.1	33.4	+ 1.0
35		35	1.2		218	35	208	14	120.5	+59.0	155.7	+48.7
36		38.5	3		243	37	234	26	99.9	+43.7	118.3	+42.8
37		43	1*		138	62(:)	135	41	337.7	+63.0	294.6	+57.6
38		47	2		299	56	290	50	55 4	+25.9	64.3	+25.1
39	10	47.5	2		162	48	157	30	298.4	+78.0	254 9	+64.7
40	11	7	2.3		235	43	234	35	104.2	+52.1	115.5	+48.4
41		15.7	2.3		186	81	172	79	31.3	+57.2	32.5	+59.1
42		16	2		272	65	247	65	64.2	+41.8	68 7	+51.8
43		16.2	2		180	70	168	58	29.8	+68.2	358.1	+77.9
44		31	3		278	39	270	37	90.5	+23.4	96.9	+26.7
45	11	40	2		340	43	347	35	50.2	+ 3.0	46.4	— 6.0

Nr.	Mittlere Wiener Zeit		Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
	h	m			A	H	A	H	AR.	Decl.	AR.	Decl.
					°	°	°	°	°	°	°	°
46	11	41	2.3		139	52	144	39	329.9	+63.8	199.8	+62.7
47		43	2		260	33	270	31	109.4	+30 3	104 7	+22.6
48		47	3		123	60	115	50	349.3	+55.8	335.3	+48.7
49	11	51	3		190	35	180	26	185.6	+74.8	218.5	+67.8

Nr. 1 und 13 sehr schnelle, Nr. 10, 14 und 31 langsame Meteore.
» 7, 8, 19 und 42 gekrümmte Bahnen.
» 25 am Ende heller werdend.

1867. November 13. Wien.
Beobachter: Prof. Felgel, Palisa, Möller und Wittek.

Nr.	h	m	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	11	47.3	2		191	9	180	8	212.4	+49.7	229.4	+49.8
2	11	49.3	2.3		215	9	215	17	181.2	+41.0	175.2	+47.8
3	12	13 3	1*		232	45	155	56	131.2	+54.8	2.3	+72.9
4		28.3	1.2		200	25	201	18	198.4	+62.0	203.0	+55.3
5		33.3	1		220	7	212	6	188 2	+36 7	197.6	+39.8
6		36.3	2		225	25	222	21	168.7	+47 9	175.7	+46 9
7		38.3	1		205	21	208	22	197.0	+56.3	191.8	+55.6
8		39.3	1		198	11	189	9	214.4	+49.9	228.5	+50.1
9		47 3	2		204	17	216	16	204 0	+53.2	189.4	+46.4
10		52.3	1*		223	11	215	13	187.1	+38.4	194.2	+44.5
11	12	53.3	1		198	15	183	14	215.8	+53.6	240.7	+55.7
12	13	11.3	1*		200	36	171	29	192.8	+70.9	273.6	+69.6
13		30.3	1.–		150	28	140	24	314.9	+59.2	322.1	+50.3
14		37.3	1		170	12	165	9	273.3	+52.8	279 9	+48.9
15		46.3	2		70	24	74	16	19.6	+ 5.4	11.6	+ 1 6
16		56.3	1		288	32	282	18	137.5	+12.7	151.0	+ 5.6
17	13	59.3	3		222	41	210	37	164.9	+60.9	188.5	+65.5
18	14	27.3	1		202	15	196	8	233.4	+52.2	245.6	+47.6
19	15	13.3	2		201	32	189	22	229.0	+67.4	262.4	+62.8
20		28.3	1.2		230	19	223	13	212 9	+40 4	224.6	+40.0
21		29.3	1		285	46	260	42	152.6	+24.6	169.4	+35.8
22		29.3	1		210	12	204	18	240.2	+46 0	243.8	+54 1
23		30.3	1		220	19	226	18	213.3	+46.5	218.0	+42.2
24		32.3	1		285	37	280	32	160.1	+18.1	166.8	+17.3
25	15	45.3	1		244	9	244	10	212.8	+23.9	212.1	+24.6

Nr. 8, 10 und 11 röthlich.
» 18 schlaugenförmige Bahn.

In den ersten Abendstunden waren die Sternschnuppen des hellen Mondlichtes wegen sehr selten. Die eigentliche Wache wurde erst nach 11^h begonnen. Es zeigten sich einzelne helle Meteore ganz vom Charakter der Leoniden und einige schwächere aus einem nördlichen Radianten im grossen Bären. Von 12^h 30^m au umwölkte sich der Himmel allmählich; die letzten Meteore wurden theils durch kleine Wolkenlücken, theils durch Federgewölk von solcher Dichte gesehen, dass Sirius eben nur noch durchschimmerte, daher die Grössenschätzungen sehr unsicher. Schluss der Beobachtungen um 16^h 9^m bei gänzlich bewölktem Himmel.

1867 November 30. Wien.

Beobachter: Palisa und Möller.

Nr.	Mittlere Wiener Zeit		Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
					A	H	A	H	AR.	Decl.	AR.	Decl.
	h	m			°	°	°	°	°	°	°	°
1	7	46.3	3		290	47	305	39	49.8	+23.0	46.0	+ 9.9
2	7	56.3	2		312	44	335	40	41.2	+11.4	27.2	+ 1.0
3	8	7.3	2*		151	45	134	33	282 7	+70.0	273.3	+52.6
4		16.3	3		195	67	185	73	30.2	+69 7	16.7	+65.1
5		26 3	2		162	76	158	76	6.9	+61.2	5.1	+60.8
6		28.3	2		230	33	235	23	109.8	+49.9	116.3	+40.1
7		31.3	3		190	52	198	41	72.7	+82 5	129.8	+75.3
8		45.3	2		52	69	57	61	0.7	+33.3	352.9	+28.4
9	8	47.3	1		270	82	42	54	32.9	+47.5	356.5	+18.2
10	9	8.3	3		193	34	188	25	167.2	+72.8	188.3	+66.0
11		15.3	2		144	23	133	20	269.4	+52.0	278.1	+43.1
12		16.3	2		77	24	82	17	323.8	+ 9.6	315.5	+ 7.4
13	9	52.3	1		295	48	291	34	78.0	+21.4	89.8	+12.7
14	10	0.3	1*		288	39	321	59	90.3	+18.1	59.7	+21.9
15		1.3	2		283	21	280	13	106.1	+ 7.3	113.6	+ 3.1
16		5.3	1*		135	25	126	17	293.6	+47.9	294 4	+36.4
17		7.3	1		222	47	220	39	117.6	+62.0	133.9	+60.0
18		11 3	2.3		352	58	357	55	46.5	+16.4	43.9	+13.2
19		14.3	2		246	50	189	66	104.6	+48.1	54.4	+71.6
20		28.3	1		326	37	335	26	72.8	+ 0.4	69.2	—12.4
21		29.3	1*		278	17	275	27	119.4	+ 7.4	114.6	+16.7
22		44.3	2		234	37	224	22	135.8	+49.6	161.3	+46.4
23		44.3	3		209	37	203	30	157.5	+66.1	178.0	+64.7
24	10	49.3	2		317	32	321	27	87.0	— 1.0	86.0	— 7.2

Nr. 13 und 21 röthlich.
» 14 langsames Meteor. Dauer 2ˢ.
» 16 kleine, funkensprühende Feuerkugel von gelber Farbe; Dauer 2ˢ.
» 19 und 24 sehr schnelle Meteore.
» 20 so hell wie Jupiter. Dauer 1ˢ.
» 22 gekrümmte Bahn.

Am 16. Jänner und 19. Februar 1868 wurde nach je einstündiger Beobachtung, ohne ein Meteor gesehen zu haben, die Beobachtung geschlossen.

1868. April 19. Wien.

Beobachter: Möller und Wittek.

Nr.	h	m	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	10	19.1	2	M	270	70	185	40	211.5	+44.5	337.5	+81.0
2		35.1	3	M	211	27	216	20	307.1	+58.0	308.4	+49.5
3		44.1	2	M	190	23	174	16	347.9	+63.6	19.8	+57.4
4		53.1	1*	M	173	44	158	37	63.0	+83 6	74.7	+70.5
5	10	56.1	2	M.W	221	39	200	27	297.3	+54.0	328.6	+63.8

Nr.	Mitlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Aufang		Ende	
				A	H	A	H	AR.	Decl.	AR	Decl.
	h m			°	°	°	°	°	°	°	°
6	10 59.1	3	M	198	60	186	14	227.6	+74.3	2.6	+55.4
7	11 5.1	3	M.W	237	41	222	29	272 8	+49.8	299.9	+52.6
8	12.1	2	M	184	33	184	25	3.3	+74.5	6.8	+66.6
9	20.1	3	M.W	184	33	158	28	5 3	+74.5	66.1	+63.6
10	22.1	5	W	236	24	270	20	296.9	+40.1	275.0	+14.8
11	23.1	2.3	W M	210	43	207	33	291.6	+68.5	315.9	+64.7
12	31.1	1.2	W	192	16	205	14	0.0	+56.3	341.2	+50.1
13	35.1	3	W	190	16	184	15	4.2	+56.7	14 9	+56.6
14	36 9	2	M	162	29	157	27	64.4	+61.4	70.6	+62.3
15	39 39	1	M	200	21	179	15	345.4	+58.4	24.7	+56.8
16	50 19	2	M.W	203	29	188	28	334.6	+63.9	5.7	+68.9
17	11 56 4	3	M	253	32	240	24	285.3	+34.1	302.1	+37.4
18	12 16 4	3	W	235	44	225	34	287.5	+52.5	308.6	+53.9
19	32 12	3	W	192	38	189	36	351.5	+76.5	4.6	+76 1
20	35 58	3	M	195	38	190	31	344.9	+75.0	19.9	+71.2
21	46 12	3	M	214	24	198	18	339.7	+53.9	7.9	+56.4
22	53 19	3	M	249	25	246	21	309.0	+32.2	314.7	+31.4
23	54 4	1.2	W	224	50	229	39	291.4	+61.6	308.0	+54.0
24	54 59	3	M.W	229	48	229	39	293 7	+57.9	308.3	+54.0
25	56 44	2	M	217	54	183	46	284.4	+66.4	358.6	+86 9
26	12 58 4	3	W	254	28	243	27	304.1	+30.8	312.8	+37.5
27	13 6 9	2	M	260	47	268	37	284 2	+38.7	289.5	+27.9
28	8 47	3	W	235	30	239	26	318.6	+44.8	319.5	+39.5
29	11 42	2.3	M	276	41	273	34	282.8	+25.9	290.2	+22.8
30	17 44	2	M.W	210	25	204	21	351.6	+56.9	4.1	+56.7
31	29 31	2.3	M	260	53	243	47	282.6	+41.7	297.2	+48.7
32	31 19	3.4	W	250	13	256	9	327.3	+23.0	325.6	+16.1
33	35 34	1	M	246	17	238	10	328.5	+28.6	340.4	+28.5
34	38 29	1*	M	250	38	242	49	307.2	+39.7	297.7	+50 1
35	41 10	1.2	M.W	220	36	208	32	331.4	+58.3	351.0	+63.4
36	13 49 51	1	W.M	238	19	236	9	336.9	+35.2	346.4	+29.0
37	14 10 56	2	W	161	19	157	12	95.4	+57.0	96.7	+49.0
38	25 1	2	M	347	45	328	41	253.9	+ 3.9	268.3	+ 3.7
39	26 34	2	M	322	36	317	29	275.0	+ 0.7	281.8	— 3.7
40	26 55	2	W	315	50	295	47	273.3	+15.6	286.5	+20.7
41	36 44	2	M	234	33	229	27	338.0	+47.2	348.8	+46 8
42	40 54	3	W	173	32	155	44	89.2	+73 0	354.2	+72.2
43	14 51 34	2	M	240	52	222	44	312 3	+52.4	333.7	+60.9
44	15 2 36	3	M	230	41	220	33	336.7	+54.3	356.2	+56.5

Ausser den beobachteten noch mehrere andere Meteore gesehen. Vertreten waren hauptsächlich drei Radianten; einer in der Nähe des Poles, einer in der Gegend von Vega und ein ziemlich südlicher: der letzte mit langsamen Meteoren, hauptsächlich in den späteren Nachtstunden. Himmel nicht ganz heiter.

1868. April 19. Wiener-Neustadt.

Beobachter: Assistent Haag.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR	Anfang Decl.	Ende AR	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
1	11 52 16	1		166	56	141	43	163.9	+78.4	120.1	+62 6
1	11 53 3	3		169	56	144	41	169.8	+79.7	114.2	+63.8
3	12 6 48	2		176.5	50	151	41	159.6	+87.1	111.3	+68.3
4	12 8 54	1		153	43	143	26	115.0	+70 5	96.2	+53.6

Der in Wien erwähnte südliche Radiant war auch hier deutlich ausgeprägt.

1868. April 19. St. Pölten.

Beobachter: Palisa.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR	Anfang Decl.	Ende AR	Ende Decl.
1	9 17 25	2		260	45	263	38	228.3	+37.6	233.5	+31.5
2	23 25	2		184	47	113	31	281.1	+87.1	85.2	+37.5
3	43 54	2		297	19	313	11	231.0	— 2.5	222.4	—17.7
4	9 52 49	2		245	30	238	29	271.4	+38.1	267.5	+42.2
5	10 18 32	2		193	48	198	40	266.2	+81.4	295.6	+74.7
6	31 45	3		221	48	199	42	260.4	+63.0	293.5	+75.3
7	35 18	2		215	20	200	12	3·9.1	+50.2	335.0	+50.1
8	43 40	2		191	20	175	12	347.1	+60.5	16.8	+53.5
9	51 47	2		171	38	151	27	46.5	+77.8	67.7	+59.1
10	53 2	1*		195	48	173	38	276.7	+80.0	40.2	+78.6
11	10 55 20	3		219	19	212	18	310.5	+47.1	319.4	+50.2
12	11 1 25	3		251	35	250	29	270.0	+37.3	276.5	+34.2
13	1 58	3		184	41	167	30	350.6	+82.3	46.9	+69.3
14	5 18	3		274	30	244	29	278.1	+36.8	281.2	+38.1
15	11 48	2		196	32	179	27	332.9	+69.8	18.0	+68.8
16	12 10	3		215	28	203	22	309.7	+56.3	332.5	+58.1
17	22 20	2		232	37	224	30	285.1	+51.0	300.5	+52.0
18	39 40	1		205	14	193	10	342.8	+50.1	2.2	+50.3
19	43 0	2		117	69	108	47	170.8	+53.6	140.3	+43.3
20	49 20	3		148	41	126	43	109.2	+66.3	127.6	+52.7
21	54 35	2		357	32	11	24	208.8	— 9.8	195.6	—17.1
22	11 55 10	3		8	14	11	11	197.7	—27.4	193.9	—30.0
23	12 6 50	1		206	52	210	48	276.7	+73.0	288.6	+70.1
24	8 54	1*		141	74	112	45	190.0	+59.3	142.5	+44.7
25	12 21 45	3		163	62	152	42	184 6	+73.3	115.9	+69.4

Nr	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
26	12 24 7	2		200	47	200	42	297.0	+74.6	301.2	+74.6
27	28 30	3		182	35	171	34	27.5	+76.6	61.2	+74.3
28	32 10	2		238	25	232	20	311.3	+39.5	321.0	+39.8
29	35 5	3		220	44	220	37	299.9	+62.3	312 4	+58.9
30	41 25	1		212	29	196	22	334.3	+58.9	6.2	+60.9
31	44 35	1*		310	42	290	34	254.0	+10.4	271.8	+13.2
32	46 10	3		227	49	218	47	289 6	+59.4	297.4	+64.6
33	12 52 10	1		310	20	312	10	267.3	− 8.5	270.9	−18.0
34	13 0 10	3		352	47	334	55	227.9	+ 5.5	237.5	+15.5

Nr. 3, 4 und 16 langsame, Nr. 15, 20, 25 und 27 sehr schnelle Meteore.
» 5 röthlich.
» 7 Dauer 1ˢ.
» 14 gekrümmte Bahn.
» 23 An Helligkeit abnehmend, schliesslich nur mehr 3. Grösse.

1868. April 22. Wien.

Beobachter: Assistent Haag, Möller und Wittek.

Nr	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	10 52 5	2.3	W	290	32	296	28	248.8	+11.6	247.1	+ 5.3
2	11 7 40	4	W	181	63	18[illegible]	58	200.0	+75.2	198.2	+80.2
3	23 5	4	W	186	23	182	16	9.2	+64.4	18.4	+57.7
4	30 50	3	H	249	61	220	47	248.9	+50.1	277.0	+63.9
5	35 45	2	H	219	34	202	23	306.8	+57.8	342 7	+59.4
6	41 40	3	H	240	67	250	52	242.7	+54 7	264.3	+46.7
7	44 6	1.2	H.W.M	232	45	200	35	282.6	+58.8	331.7	+70.2
8	47 9	2	W.M	202	48	196	35	290.5	+75.3	340.2	+72.2
9	11 50 3	2.3	H	249	34	239	40	287.7	+38.0	298.7	+42 1
10	12 2 30	3	W	222	30	208	28	316.1	+53.3	334.8	+60.4
11	3 25	2.3	.	99	32	64	23	139.1	+29.0	156.3	+ 1.3
12	10 45	1.2	H	195	36	180	16	346.3	+73.5	33.9	+57.8
13	12 40	2.3	H	153	37	230	25	104.8	+67.4	316.8	+44.7
14	13 24	2.3	W.M	265	38	242	31	280.0	+30.3	301.3	+40.7
15	13 45	1.2	H	203	35	190	15	334.1	+68.5	17.4	+55.8
16	15 39	3.4	W	268	32	261	28	283.9	+24.5	291.6	+26.3
17	25 43	3	H	195	26	182	22	4.5	+64.9	33.5	+63.7
18	26 14	3	W	235	62	240	54	262.6	+56.9	275.6	+53.0
19	50 55	2.3	H	262	46	235	42	283.3	+56.9	302.2	+51.6
20	12 55 50	2	M	180	46	191	37	45.3	+87.8	5.6	+76.2

Nr.	Mittlere Wiener Zeit			Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
	h	m	s			A	H	A	H	AR.	Decl.	AR.	Decl.
						°	°	°	°	°	°	°	°
21	12	57	0	2	H	179	41	200	35	51.5	+82.7	350.0	+70.2
22	13	0	21	2	H	202	27	234	26	359.5	+62.8	324 4	+42.8
23		2	47	1.2	H	246	50	121	39	288.8	+48.1	319.0	+59.3
24		8	5	2.3	W	100	73	120	65	202.6	+48.3	188.9	+54.7
25		9	55	2	H	201	77	102	60	238.1	+60.0	184.4	+45.7
26		14	47	2	H	99	55	149	41	180.2	+42.2	133.4	+67.0
27		25	33	2.3	W	136	36	126	32	138.4	+55.7	141.2	+46.6
28		27	40	1.2	H	155	34	137	27	115.1	+66.6	126.5	+50.6
29		29	24	2	W	107	46	181	42	170.0	+42.2	168.8	+36.4
30		34	48	2	H	217	62	178	43	277.4	+65.3	70.9	+84.6
31		35	45	1.2	H W	120	22	96	17	138.5	+36.0	152.5	+16.6
32		39	5	1	W	86	28	93	27	168.2	+18.0	162.8	+27.7
33		40	5	3	W	153	52	145	46	169.0	+72.4	154.3	+66.3
34		47	48	2	M	35	56	28	51	218.5	+18.2	220.8	+12.1
35		48	7	3	W	46	55	51	50	212.2	+20.2	206.7	+17.5
36		50	10	1.2	H	208	58	178	46	287.9	+70.7	191.3	+87.4
37	13	52	37	1.2	W	45	22	50	17	197.9	— 9.0	191.2	—11.0
38	14	0	17	2.3	W	88	26	92	25	170.7	+17.8	167.3	+19.6
39		0	52	2	H	133	20	87	17	131.7	+43.1	165.2	+10.5
40		1	20	2	W	341	63	349	56	251.0	+22.3	248 1	+14.6
41		3	25	2.3	W	120	32	126	30	155.1	+42.7	148.4	+45.4
42		10	45	1*	W	180	36	186	25	64.0	+77.8	50.4	+66.4
43		11	50	1	H.W	154	73	196	13	112.8	+57.5	71.0	+54.6
44		12	45	1.2	H	155	47	137	39	159.8	+73.2	154.0	+58.0
45		15	52	2.3	H	118	48	131	26	179.2	+49.7	151.4	+39.5
46		16	35	3	W	116	35	123	34	164.3	+41.8	158.5	+45.9
47		17	29	2.3	W	130	41	133	45	163.1	+54.3	164.5	+57.3
48		18	45	3	W	111	33	106	29	166.1	+37.4	165.7	+31.5
49		25	35	1	H.W	184	43	166	36	38.2	+84.1	113.1	+74.0
50		25	50	2.3	M.W	197	47	187	39	337.4	+78.5	36.5	+79.5
51		31	8	2.3	H	170	74	184	55	243.0	+63.9	267.7	+82.8
52		32	0	2.3	W	230	42	232	38	330.5	+54.8	335.0	+51.5
53		36	52	1	H	264	50	254	44	304.8	+38.0	316.1	+40.5
54		38	31	2	W	135	19	142	15	138 2	+43.6	127.4	+44.5
55		38	59	2	M	159	36	155	28	130.5	+70.4	123.8	+62.1
56		41	31	2	M	145	63	125	55	212.3	+65.8	194.4	+56.1
57		44	33	2*	M	220	70	160	65	279 6	+61.0	227.3	+70.2
58		44	50	1	H	123	73	181	65	227.3	+55.0	254.1	+73.2
59		45	27	2.3	W	155	25	161	24	121.9	+59.6	111.3	+61.5
60	14	45	47	1.2	H	102	65	62	49	215.3	+47.3	214.4	+20.9

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
61	14 47 21	3	M	153	34	143	30	137.9	+65.4	143.9	+56.5
62	49 46	2	W	239	30	233	21	343.7	+42.1	357 4	+40 0
63	53 18	2	H	193	35	178	25	33.8	+73.7	79.3	+66 7
64	14 54 59	2	M	205	55	204	46	312.0	+73.2	343.8	+73.6
65	15 1 45	1	W	182	46	165	31	43.9	+87.4	115.3	+69.4
66	1 45	1	H	171	50	184	27	186 6	+83.9	66.5	+68.6
67	7 33	3	W	186	42	175	38	41.8	+82.5	99.7	+79.2
68	10 36	2.3	W	140	60	137	56	211.2	+64.3	201.9	+63.0
69	13 53	2	M	245	61	228	65	305.6	+52.0	298.5	+59.7
70	18 16	2	W	227	65	216	57	299.4	+60.2	315.2	+66.8
71	20 5	2	M	139	60	125	51	213.4	+63.8	197.1	+55.1
72	28 31	2.3	W	40	58	45	52	242.1	+21.3	236.3	+17.3
73	15 29 55	1	H	233	73	227	38	288 7	+56.1	342.9	+34.8

Nr. 7 schwächer werdend.
Nr. 42 und 43 durch Wolken beobachtet.
Nr. 49 sehr schönes, bläuliches Meteor.

1868. April 22. St. Pölten

Beobachter: Palisa.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	9 38 17	1		221	33	175	20	276.3	+55.9	5.0	+61.5
2	44 57	1*		255	73	141	64	201.2	+49.8	138.1	+63.8
3	9 59 5	3		272	64	243	72	216.0	+41.3	207.8	+53 4
4	10 15 0	1		340	43	342	32	198.7	+ 3.0	199.6	— 8.2
5	11 5 57	3		308	39	296	35	235.3	+ 8.7	245.6	+10.9
6	12 4 37	3		352	60	2	55	215.9	+18.4	210.5	+13.2

Nr. 1 Dauer 2^s.
» 6 gekrümmte Bahn.

1868 Juni 14. Wien.

Beobachter: Palisa.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	9 58 8	2		253	53	267	48	278.3	+45.5	278.1	+35.3
2	10 33.8	2		242	40	191	38	318.6	+46.0	19.8	+77.0
3	41.8	2		252	38	261	35	316.9	+38.4	314.4	+30.9
4	10 58.8	3		330	31	357	26	273.7	— 6 0	250.9	—15.8
5	11 10.2	3		240	32	229	29	338.1	+42.7	350.0	+48.1

Beobachtung um $11\frac{1}{2}^h$ abgebrochen.

1868 Juni 15. Wien.

Beobachter: Palisa, Wittek und Rosner.

Nr.	Mittlere Wiener Zeit h	m	Grösse	Beobachter	Anfang A	H	Ende A	H	Anfang AR.	Decl.	Ende AR.	Decl.
					°	°	°	°	°	°	°	°
1	10	15	3.4	W	209	25	202	23	3.3	+57.5	15.7	+59.4
2		21	2	P	31	26	36	16	211.5	−10.7	207.3	− 9.0
3		23	3	R	262	76	261	73	261.3	+48.3	265.8	+48.0
4		25	1	P	55	30	51	21	195.4	+ 2.4	193.8	− 7.1
5		27	3	P	85	47	80	35	189.3	+30.4	182.3	+19.5
6		31	.	W	232	20	223	17	347.6	+39.8	358.8	+43.2
7		32	2	P	19	22	20	19	223.9	−17.7	222.2	−20.5
8		39	2	P	65	19	68	12	185.2	− 1.3	178.6	− 5.1
9		40	3	W	131	32	123	31	148.9	+50.0	154 1	+44.1
10		44	2.3*	P.R	141	78	156	50	231.5	+56.9	170.9	+74.2
11		48	3	R	175	87	151	81	246 0	+51.2	238.6	+55.9
12	10	52	3	P	141	35	140	29	147.3	+58.4	139 9	+53.9
13	11	3	2	P	69	53	63	49	211.1	+26.9	211.3	+21.3
14		3	2 3	W	130	17	127	14	140 4	+39.0	140.7	+34.8
15		4	1*	R	303	41	327	46	290.8	+12.5	273.0	+ 8.4
16		7	2	W	23	46	10	44	235.3	+ 6.3	244.0	+ 2.6
17		11	3	P	98	49	92	44	196.0	+38.6	193.9	+32.3
18		13	2	R	225	37	244	40	344.7	+55.6	328 2	+44.7
19		21	1	P	19	45	28	47	241.3	+ 4.7	235.8	+ 8.3
20		22	3	R	19	25	29	46	237.1	−14.8	235.0	+ 7.5
21		27	3	P	318	60	359	60	277.6	+23.5	256.8	+18.2
22		28	1	P	45	25	60	21	216.3	6.4	201.0	− 2.5
23		29	2	R	194	32	182	30	98.5	+70 6	71.1	+71.7
24		30	1*	R	190	8	166	5	61.7	+48.9	96.8	+45.2
25		39	3	W	32	28	36	26	231.0	− 8.6	226.8	− 9.0
26		41	3	R	231	29	238	30	357.0	+46.8	350.3	+42.8
27		42	2	P	120	54	127	51	202.1	+53.0	195.0	+56.3
28		43	3	R	89	37	98	39	197.4	+26.1	193.9	+32.8
29		47	2*	R	250	42	229	46	331.0	+42.0	336.3	+57.2
30		50	2	R	352	32	344	36	268.8	− 9.5	274.8	− 4.6
31		55	2*	R	26	28	35	22	240 0	−10.2	230.1	−13.1
32		58	2	W	103	41	198	38	196 8	+37.1	25.3	+73.4
33	11	59	1	W	89	38	94	26	202.3	+26 7	189.5	+21.6
34	12	1	1*	R	21	11	31	3	241.2	−28.0	227.3	−32.1
35	12	1	1	W	16	15	14	11	247.5	−25.2	248.8	−29.5

Nr.	Mittlere Wiener Zeit		Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
	h	m			A	H	A	H	AR.	Dec.	AR.	Decl.
					°	°	°	°	°	°	°	°
36	12	3	1*	P	297	59	10	62	296.9	+23.9	260.2	+20.5
37		6	2	P	135	32	134	28	167.0	+52.7	163.1	+49.3
38		8	1	P	339	35	331	32	283.6	— 4.6	290.8	— 5.7
39		10	2	R	51	39	45	29	229.2	+ 8.3	228.6	— 2.9
40		12	3	P	1	25	1	19	266.4	—16.8	266.3	—22.8
41	12	13	3	R	245	51	225	39	328.5	+49.1	356.7	+56.6

Nr. 38 sehr langsames, Nr. 39 sehr schnelles Meteor.

1868. Juni 16. Wien.

Beobachter: Palisa und Rosner.

Nr.	h	m	Grösse	Beobachter	A	H	A	H	AR.	Dec.	AR.	Decl.
1	10	2	2*	R	36	45	64	35	211.2	+ 8.4	187.4	+10.9
2		8	2	R	33	66	61	58	223.0	+27.0	205.9	+27.4
3		11	2.3	P	348	54	5	49	245.4	+12.7	234.9	+ 7.3
4		25	3.4	R	234	45	241	46	326.0	+53.5	311.1	+49.6
5		29	2*	P	71	44	107	28	195.8	+21.2	160.8	+31.5
6		33	2.3	P	57	75	45	58	227.5	+38.7	219.8	+22.5
7		36	3	R	131	68	157	73	211.4	+58.8	229.8	+63.2
8		38	2*	R	179	57	162	39	241.4	+81.2	126.2	+74.1
9		46	3.4	R	220	28	221	24	355.7	+53.2	359.0	+49.7
10		53	2	R	194	24	197	24	39.1	+63.4	33.6	+62.3
11	10	59	3	P	22	53	21	49	236.9	+13.0	236.4	+ 8.9
12	11	2	1	P	357	62	29	68	252.4	+20.2	239.0	+28.2
13		5	3	P	333	43	355	35	271.2	+ 4.3	255.8	— 6.7
14		15	1	P	41	19	53	14	214.6	—13.4	201.7	—12.0
15		18	1*	P	192	86	201	63	256.2	+52.2	285.3	+71.3
16		44	1	P	350	47	0	16	268.3	+ 5.6	261.4	—25.8
17	11	52	1	P	90	74	84	56	240.1	+45.8	220.4	+35.4
18	12	4	3.4	R	314	42	310	25	299.2	+ 8.9	310.5	— 4.2
19		5	4	R	246	41	234	29	339.9	+43.0	1.6	+44.8
20		9	3	R	341	25	49	19	285.5	—14.8	221.3	— 9.8
21		10	3	P	179	65	164	60	266.5	+73.2	235.8	+75.0
22		18	2.3	P	211	28	191	22	29.0	+58.7	67.5	+62.4
23		19	2	R	115	13	117	2	170.1	+26.3	160.7	+19.3
24	12	31	2	R	348	38	351	30	282.6	— 3.1	281.2	—11.4

Nr 5 kleine Feuerkugel: Dauer 2^s—3^s.
„ 14 langsames Meteor.
„ 15 Dauer 1^s.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	1868. Juni 20. Wien. Beobachter: Palisa.										
	h m			°	°	°	°	°	°	°	°
1	10 31	2		296	65	285	60	274.3	+33.5	282.8	+34.0
2	34	2.3		61	38	69	29	203.1	+11.7	192.2	+ 8.7
3	45	3		73	45	75	36	203.3	+22.9	195.6	+17.3
4	10 48	2		63	32	73	27	201.6	+ 8.0	191.7	+ 9.4
5	11 0	4		356	56	315	47	268.1	+16.1	284.1	+13.0
6	17	1.2		314	64	305	48	279.5	+27.8	293.7	+17.3
7	20	2		40	29	38	19	225.0	— 4.9	222.4	—14.7
8	22	♃*		3	32	353	42	257.3	— 9.8	265.2	+ 0.4
9	32	3		34	38	41	26	236.2	+ 1.3	225.9	— 7.2
10	49	2.3		292	33	288	25	319.7	+11.4	326.9	+ 7.4
11	50	3		58	58	47	51	236.7	+26.4	238.0	+17.0
12	53	2		329	35	315	31	292.7	— 2.3	305.0	— 1.1
13	57	1.2		13	33	16	24	257.5	— 8.0	253.4	—16.4
14	11 59	3		68	35	85	35	217.9	+13.0	207.2	+22.3
15	12 11	2		37	49	44	35	248.3	+12.3	237.4	+ 2.0
16	14	3		51	65	59	60	250.6	+29.8	252.9	+22.7
17	12 15	1		335	26	347	18	296.0	—12.4	286.6	—22.8

Nr. 8 kleine rothe Feuerkugel. Dauer 2^s—3^s.
„ 11 Eigentlich ein Doppelmeteor: beide Componenten flogen in einer gegenseitigen Entfernung wie Mizar und Alcor neben einander her.
„ 12 langsames Meteor. Dauer 1^s.
„ 13 und 15 sehr schnelle Meteore.
„ 14 Dauer 2^s.

An diesem Abende wurde auch um 9^h 19^m eine kleine Feuerkugel, heller als Venus gesehen, die am Ende zerplatzte und vom Polarsterne gegen die Mitte der Cassiopeja hinzog.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	1868. Juni 22. Wien. Beobachter: Palisa.										
1	10 20	3		355	60	350	54	249.0	+18.3	252.3	+12.5
2	10 36	1.2		113	38	95	25	174.3	+41.7	174.1	+21.6
	1868. November 10. Wien. Beobachter: Palisa.										
1	7 20.2	2		247	23	251	15	70.5	+32.1	73.9	+23.8
2	34.2	2		173	36	160	29	189.3	+76.7	209.9	+65.4
3	7 34.2	2		190	60	193	53	6.4	+76.8	38.9	+80.5
4	8 25.2	3		219	19	208	15	115.6	+47.1	132.1	+49.6
5	8 30.2	1.2		153	30	104	59	349.3	+56.9	311.4	+46.3

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR	Ende Decl.
	h m			°	°	°	°	°	°	°	°
6	8 33.2	2		268	31	272	24	67.0	+23.8	70.6	+16.4
7	56.2	3		40	41	35	29	334.9	+ 6.0	333.8	— 6.4
8	8 56.2	2		243	35	237	34	85.9	+42.5	91.1	+45.9

1868. November 20 Wien

Beobachter: Palisa und Rosner.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR	Ende Decl.
1	8 53	1	P	27	12	25	12	343.8	—25.2	345.8	—25.8
2	9 8	4	R	266	41	248	37	79.1	+31.6	93.5	+40.4

Nr. 1 sehr schönes Meteor

1868. December 7. Wien.

Beobachter: Palisa, Rosner und Hron.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR	Ende Decl.
	h m s										
1	8 35 55	2.3		138	41	114	37	297.9	+59.6	308.1	+41.7
2	54 42	3		151	34	142	26	277.9	+64.2	277.5	+53.0
3	8 55 22	1		153	29	158	26	267.7	+61.8	256.4	+61.9
4	9 1 7	3		20	38	31	30	16.5	— 1.9	5.5	— 7.0
5	2 2	2		51	31	55	33	350.5	+ 1.4	348.7	+ 4.9
6	5 57	2		21	50	40	31	19.8	+ 9.9	359.8	— 3.1
7	8 17	1		347	44	13	19	43.4	+ 2.9	20.7	—21.1
8	20 57	3		19	?8	24	30	22.2	— 2.1	16.2	— 8.8
9	22 47	2		20	32	25	26	20.6	— 7.8	14.7	—12.4
10	23 2	2		49	12	42	9	347.6	—15.8	352.3	—21.9
11	24 7	2		40	61	90	26	18.0	+23.9	325.9	+19.1
12	37 19	2		134	45	99	39	322.9	+58.7	334.4	+33 4
13	39 42	2		33	40	49	25	17.1	+ 2.9	358.5	— 4.7
14	45 7	2		13	51	24	38	34.9	+ 9.9	24.5	— 1.1
15	9 49 42	2		224	21	210	19	156.3	+45.7	174.0	+52.1
16	10 1 47	3		68	44	66	49	2.2	+19.8	6.8	+22.7
17	4 2	3		276	50	335	34	96.6	+31 8	68.5	— 4.8
18	4 57	3		39	25	43	21	12.8	— 8.9	7.7	—10.8
19	5 48	2		163	47	148	31	318.7	+78.5	294.6	+60.3
20	8 57	1		105	42	187	33	149.3	+71.4	207.5	+74.0
21	10 54	3		126	36	133	21	322.8	+49.0	300.6	+43.9
22	20 12	1		43	23	52	15	12.5	— 9.1	0.9	—11.7
23	26 42	1		124	18	114	14	310.0	+35.8	315.1	+26.3
24	29 42	2		34	41	42	29	29.3	+ 4.2	18.4	— 4.1
25	10 29 42	1		138	51	141	37	346.2	+63 0	317.3	+59.6

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
26	10 34 42	2 :		126	34	112	23	326.4	+47.8	325.8	+31.4
27	38 42	1		140	22	110	16	301.5	+48.8	322.7	+25.2
28	42 42	2		193	40	200	25	184.2	+77.6	196.3	+62.0
29	43 42	2		36	65	58	49	41.6	+26.6	21.6	+19.3
30	44 42	2		132	42	121	26	335.8	+56.1	324.2	+39.5
31	49 42	2		169	47	141	38	324.1	+82.5	324.0	+60.1
32	52 42	3		356	60	8	53	62.2	+18.3	55.2	+11.4
33	53 42	2		214	24	218	23	180.1	+53.9	176.5	+50.8
34	54 32	1		16	78	34	59	56.4	+36.6	42.6	+20.8
35	55 2	3		31	48	54	32	40.2	+ 9.8	17.2	+ 3.6
36	57 22	2		86	22	80	14	349.0	+13.7	347.9	+ 3.9
37	58 7	3		317	36	315	31	94.9	+ 2 5	98.8	— 1.0
38	10 59 2	1*		292	35	284	13	112.9	+13.0	132.7	+ 0.5
39	11 3 2	2		358	65	8	64	63.7	+23.2	58 9	+22.4
40	8 31	3.4		346	60	355	60	71.5	+18.8	66.8	+18.3
41	10 16	3		175	13	170	15	254.0	+59.5	261.9	+55.8
42	12 21	2.3		89	55	98	51	19.1	+37.2	11.1	+39.6
43	13 21	2		47	52	52	38	37.0	+17.9	26.5	+ 7.8
44	14 11	2		41	36	51	28	33.4	+ 1.7	22.1	— 1.2
45	14 56	4		60	73	88	66	46.9	+38.0	32.4	+42.2
46	18 51	4		354	49	10	42	70.7	+ 7.4	59.2	+ 0.6
47	19 21	4.5		345	45	336	36	77.4	+ 4.1	86.0	— 3.1
48	20 56	2		13	31	25	21	55.9	— 9 9	42.7	—17.3
49	21 39	1		136	56	137	43	10 4	+62.4	343.8	+59.9
50	22 31	3		16	45	30	37	56.3	+ 4.3	44.1	— 0.7
51	24 6	2		35	21	52	10	34.5	—14.1	14 2	—15.9
52	26 16	3		39	50	51	40	43.9	+13.7	31.4	+ 9.1
53	30 1	4		198	25	196	21	211.7	+62.8	218.6	+60.0
54	30 56	3		13	29	17	27	58.0	—11.9	54.1	—13.2
55	32 11	3		38	41	49	39	42.2	+ 5.4	33.7	+ 7.5
56	34 41	2		162	53	148	58	10.2	+77.6	20.1	+68.7
57	38 31	2		152	63	147	48	35.8	+68.6	353.5	+68.2
58	41 36	1.2		154	37	150	31	321.5	+68.0	316.2	+61.5
59	48 56	4		119	41	126	39	358.2	+47.2	351.3	+50.7
60	11 57 51	2		27	39	35	29	55.7	+ 0.5	46.1	— 6.7
61	12 5 56	2		325	33	318	17	107 4	— 3.0	119.9	—14.8
62	8 51	3		350	36	356	26	87.3	— 5.3	82.9	—15 7
63	9 11	3.4		56	40	63	31	39.0	+11.2	28.9	+ 7.2
64	9 36	3		67	27	56	21	23.8	+ 6.0	28.5	— 4 6
65	12 10 1	3		68	44	63	37	34.4	+19 8	32.8	+11.9

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
66	12 10 21	2		190	37	173	28	222.8	+76.6	277.1	+69.1
67	11 11	2		100	24	91	29	359.4	+24.1	9.4	+21.8
68	11 51	1		143	34	140	19	336.3	+59.1	321.9	+46.5
69	12 21	1*		60	24	52	14	27.8	— 0.1	28.5	—12.5
70	18 46	2		183	29	168	20	253.7	+70.7	284.9	+60.2
71	20 31	2		111	31	118	21	0.2	+36.1	346.0	+34.0
72	22 51	3		60	63	54	55	55.4	+30.9	52.4	+22.7
73	28 21	2		135	57	123	45	29.3	+61.9	11.3	+51.7
74	28 51	2.3		22	51	54	35	70.3	+11.1	42.3	+ 6.1
75	31 31	3		206	34	200	27	201.6	+66.0	221.4	+63.8
76	32 1	1		195	55	213	38	133.2	+78.5	185.9	+64.1
77	34 41	1		162	58	170	25	324.2	+73.4	287.9	+65.5
78	34 41	2		171	30	173	19	289.7	+70 5	279.2	+60.3
79	36 36	4		31	13	41	9	53.1	—22.9	41.6	—22.4
80	40 31	3		155	35	157	25	330.8	+67.3	313.3	+60.6
81	41 21	4.5		8	40	10	23	81.2	— 1.5	77.6	—18.2
82	43 21	1		42	19	51	10	47.3	—13.0	34.8	—16.5
83	47 26	3		32	32	47	25	62.0	— 4.8	47.1	— 5.6
84	48 36	3		348	45	340	32	97.6	+ 3.8	106.1	— 7 8
85	12 57 26	1		181	51	164	27	104.0	+87.1	307.4	+65.4

Nr. 38 sehr schönes, geschweiftes Meteor von grünlich-violetter Farbe.
» 68 Meteor von Jupitergrösse.
» 69 Farbe bläulich.

1868 December 10. Wien.

Beobachter: Palisa, Rosner, Hron, Sauter und Holetschek.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	9 10 56	2		22	60	45	43	27.1	+19.4	5.9	+ 9 4
2	11 56	2		159	26	155	16	261 9	+62.4	258.9	+51.9
3	17 56	3		158	43	151	35	298.6	+73.8	288.4	+64.9
4	21 36	3		163	58	156	49	0.7	+75.9	322.1	+74.1
5	24 56	1		146	48	158	51	323.4	+67 5	330.4	+75.5
6	26 26	2		13	54	37	41	33.7	+12.8	14.4	+ 5.1
7	30 26	2		244	28	203	17	130.7	+37.4	183.5	+53.6
8	32 56	2		326	48	330	39	65.5	+10.6	66.0	+ 1.3
9	33 11	3		32	63	54	59	27.9	+24.1	15.6	+25.9
10	41 11	3		193	48	178	42	131.6	+81.4	238.6	+83.6
11	41 26	3		188	56	158	42	74.3	+80.8	301.4	+73.3
12	41 36	1		15	33	27	28	32.6	— 7.7	21.2	—10.0
13	47 46	1		47	54	69	32	19.6	+19.7	353.0	+11.1
14	48 16	3		73	32	76	21	350.4	+13.2	341.2	+ 6.7
15	9 52 26	1		135	34	126	25	311.8	+53.9	309.0	+42.1

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
16	9 59 56	4		355	33	7	30	54.0	— 8.7	43.6	—11.6
17	10 4 6	1		240	15	151	20	145.0	+38.1	140.9	+27.3
18	6 36	2		216	25	210	19	167.9	+53.5	181.5	+52.1
19	20 16	1		222	39	200	17	146.2	+58.6	191.4	+63.8
20	22 11	1		251	64	264	61	95.5	+50.0	96.9	+43.3
21	10 28 39	1		121	53	108	27	357.3	+53.3	333.5	+31.5

1869. Juni 4. Wien.

Beobachter: Prof. v. Oppolzer, Palisa und Rosner.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	10 47 1	3.4	P	187	50	191	44	301.2	+85.1	350.1	+81.4
2	50 36	1	P.R	239	41.5	230.5	36.5	312.5	+48.7	324.7	+51.7
3	10 56 6	2.3	P.O	202	36.5	186	29	355.2	+70.1	40.4	+70.2
4	11 2 36	5	O	188	29 5	176	27	39 4	+69.7	71.1	+68.8
5	29 21	3	R	281	38	289	32	301.7	+21.0	300.9	+12.1
6	30 36	3	P.O	184	26	177.5	22.5	56.6	+67.6	71.4	+64.2
7	36 36	4	R	255	65	145	61	285.7	+48.5	293.3	+52.0
8	42 50	2	R	231	34	224	28	340.5	+49.9	253.8	+50.6
9	49 6	5	O	223	58	218	50	303.4	+63.0	322.2	+65.3
10	51 6	1	R	295	21	300	14	309.0	+ 0.2	309.3	— 8 2
11	57 6	1	O	148	20	142	13	126.4	+51.8	127.5	+42.8
12	11 57 56	1	R	283	17	296	8	322.1	+ 4.2	316.8	—10.7
13	12 1 51	3	O	173	50	151	43	187.9	+85.1	160.3	+69.2
14	2 46	2	P.R	237.5	43	242	38.5	329.4	+50.4	332.6	+45.2
15	12 48	3.4	P.R	285	39.5	308	40.5	308.9	+19.9	293.9	+10.0
16	18 40	2.3	P.R	274.5	62.5	258	64	294.8	+39.5	297.0	+47.0
17	33 21	2	O.P.R	253	22	262.5	18.5	348.6	+27.4	344.5	+18.6
18	35 21	2.3	O.P.R	242.5	24	238	21	355.2	+35.8	1.5	+36.7
19	37 26	4.5	R	237	48	.....	....	331.0	+52.9	.	.
20	38 6	4	O.P.R	231	41	238.5	38.5	344.9	+53.7	343.6	+47.5
21	39 6	3.4	O.P.Ŕ	200	50	192.5	38	337.9	+76.7	37.0	+76 2
22	44 4	4	O.R	228	67.5	235	62.5	298.2	+59.2	308.3	+56.9
23	53 6	1.2*	O.P.R	216	48.5	192.5	38	342.4	+66.3	40.5	+76.2
24	54 36	2	P	211	41	.....	....	3.7	+67.0	.	.
25	12 55 12	3	P	122	26	135	16	172.5	+40.2	151.8	+41 2
26	13 6 10	2.3	P.R	239.5	16	234	10	12.1	+32.0	21.6	+31.1
27	13 26 6	2.3	O.P.R	170.5	20	163.5	13.5	113.5	+60.8	121.9	+52.7

Nr. 3 und 6 heller werdend.
» 15 stark gekrümmte Bahn.
» 17 schlangenförmige Bahn.
» 19 und 24 Mitte sehr kurzer Bahnen.
» 21 sehr schnelles Meteor.
» 27 nebelartiges Meteor in Form eines Kolbens oder Tropfens.
Beobachtungen um 10^h 35^m begonnen und um 13^h 40^m geschlossen.

1869. Juni 9. Wien.

Beobachter: Prof. v. Oppolzer, Palisa und Rosner.

Nr.	Mittlere Wiener Zeit h	m	s	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
						°	°	°	°	°	°	°	°
1	10	29	44	4	O	240	37	.....	....	317.4	+45.7	.	.
2		31	26	2	O.P	198	39	217	31	355.0	+74.1	344.1	+57.2
3		36	11	2.3	O.R	153	38	150.5	23	129.8	+68 0	110.9	+55.6
4	10	50	56	3	R	106.5	51	112	46.5	183.6	+44.4	175.6	+45.4
5	11	25	49	3	O.P.R	240	57	230	52	302.8	+53.7	313.8	+58.4
6		34	54	1	O.P.R	281.5	37	257	32	308.5	+20.0	326.7	+32.2
7	11	50	16	2	P	167	21	179	16	101.5	+60.9	77.5	+57.8
8	12	4	56	4	O	223	58	220.5	49	312.3	+63.0	332.5	+63.6
9		5	51	3	O	173	46	167	42	147.5	+84.8	140.6	+79.0
10		11	44	3	O.P	216	16	213.5	12.5	26.3	+46.4	31.9	+44.8
11		20	31	2	O.R	237	61.5	243	58.5	309.0	+56.0	313.4	+52.5
12		21	56	1*	O.P.R	170	24	157.5	16.5	105.5	+64.5	121.7	+53.3
13		37	2	3	P	187	65	189	62	277.7	+72.8	284.4	+75.3
14		41	26	4	R	313	62	.....	...	291.3	+26.4	.	.
15		47	24	3	O.R	205	29.5	202	30	35.4	+63.3	39.5	+65 2
16		56	16	. '	O.P.R	182	20.5	176	18	88.3	+62.2	99.9	+59.6
17	12	57	16	4	O	283	22	284	18	338.7	+ 8.1	340.7	+ 4.4
18	13	15	36	4	O.R	226.5	32	230	29	14.7	+51.6	15.4	+47.4

Nr. 1 und 14 Mitte sehr kurzer Bahnen
» 2 Intermittirend ebenso Nr. 16.
» 12 Nebelartig.

1869. Juni 12. Wien.

Beobachter: Prof. v. Oppolzer und Rosner.

Nr.	Mittlere Wiener Zeit h	m	s	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	11	41	5	2	O.R	176	41	162	32.5	99.5	+82.3	123.9	+69.3
2		46	25	4	O	154	41	160	37	156.2	+70.2	137.8	+71.6
3		52	30	4	R	260	54	281	49	310.7	+42.2	306.6	+28.7
4		55	15	4	R	296	56	195	54	314.2	+72.4	312.8	+79.0
5	11	56	55	4	O	215	29	210	25	13.3	+57.1	24.3	+56.9

1869. Juli 12. Wien.

Beobachter: Palisa und Rosner.

Nr.	Mittlere Wiener Zeit h	m	s	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	11	19	39	3	P.R	160	59	159.5	55	240.9	+74.1	226.6	+75.6
2		32	49	1.2	P.R	157	23	170	15	148.2	+59.0	121.4	+55 8
3		39	44	3	R	235	59.5	220	62.5	335.1	+56.7	328.0	+63.8
4		49	19	2	R	247	20.5	244	18.5	20.8	+30.3	24.8	+30.9
5	11	50	39	4	R	233	44.5	233	43.5	4.0	+54.0	5.5	+53.6

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
6	11 55 43	2	P	256	43.5	257	46.5	354.0	+39.0	351.0	+40.1
7	12 10 34	4	R	183	53.5	162	49.5	312.3	+84.3	216.5	+78.0
8	13 49	4	R	235	46.5	242	40.5	5.7	+53.8	11.5	+47.5
9	22 34	3	R	226	69.5	235	76.5	325.2	+59.3	313.1	+56.6
10	24 45	4	R	208	61.5	191	63.5	336.6	+69.3	314.7	+73.5
11	26 39	3	P	141	25	124	17	184.5	+51.7	193.2	+35.1
12	28 34	1*	P.R	294	55	275.5	53	334.1	+27.1	344.2	+33.8
13	38 19	2	P.R	185	43	164	43	85.2	+83.7	191.5	+77.7
14	42 9	1	P.R	66	25	51.5	16	245.3	+ 4.0	251.3	—11.1
15	43 49	4	P.R	203.5	48	208	48	23.7	+74.3	21.9	+71.4
16	12 52 29	3	R	246	57.5	257	56.5	354.9	+50.7	353.2	+44.8
17	13 0 34	.	R	218	52.5	198	50.5	11.5	+65.6	18.2	+78.0
18	9 4	3	R	197	59	200.5	55	344.5	+75.3	2.3	+75.6
19	20 15	4	R	179	63	187	46.5	309.1	+75.2	57.9	+85.0
20	21 19	1	R	237.5	27	239	25	45.3	+41.2	46.1	+38.8
21	23 19	1*	P	137	47	117	35	235.7	+61.4	229.9	+42.5
22	31 34	3	R	186	48.5	162	48.5	37.5	+86.0	232.0	+78.0
23	51 29	4	P	254	69	349	83	350.9	+49.6	320.6	+41.3
24	13 55 24	1	R	269	26.5	262	23.5	31.9	+20.0	39.0	+22.4

Nr. 2. Sehr langsam.

1869, Juli 13. Wien.

Beobachter: Prof. v. Oppolzer, Palisa und Rosner.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	11 15 41	1	P	223	43	227	52	4.4	+59.9	345.6	+60.2
2	28 6	2	O.R	166	72.5	133	75	273.6	+65.0	263.1	+57.0
3	46 58	1*	O	85.5	50	77.5	38	239.2	+32.5	233.5	+20.2
4	48 36	1.2*	O.P	287	52	313	53	330.8	+27.8	316.8	+18.8
5	53 22	3	O	234.5	16.5	230.5	13	36.3	+35.7	42.7	+35.9
6	54 41	3	P.R	169	43.5	151	41	173.0	+81.0	191.9	+68.3
7	11 57 4	4	O.P.R	213	64.5	182	71.5	328.8	+66.0	295.2	+66.7
8	12 7 46	4	O	204.5	34	194.5	32	52.8	+66.9	74.5	+70.4
9	10 15	5	O	245.5	37	247.5	43	12.4	+42.0	4.4	+44.0
10	17 41	2	O.P	311	58	333	50.5	322.2	+23.6	313.4	+11.4
11	26 30	2	O.R	218	26.5	216	21	51.0	+53.4	59.1	+50.4
12	31 54	4	O	215.5	27	224.5	30	54.6	+55 3	41.7	+51.7
13	32 41	2	O.P.R	233	41.5	241	39	20.1	+52.6	18.6	+46 2
14	34 36	4	R	235	51	242	43	4.8	+55.1	13.4	+47.5
15	12 37 35	3	R	68	72	45	60	279.6	+39.2	278.5	+24.2

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
16	12 40 6	2	O.R	209	19	212	14	72.9	+52.6	73.2	+46.8
17	45 33	2	R	278	29	274	25	7.8	+16.3	13.4	+15.8
18	52 0	4	O P.R	230	30.5	228	24	41.3	+48 3	50.1	+45.3
19	12 56 31	2	P	245	39	243	29	22.1	+43.6	34.0	+38.8
20	13 0 21	2	R	252	15	253	12	40.1	+23.1	41.4	+20.3
21	4 52	6	O.P	235	43.5	240	50	24.1	+52.3	12.1	+51.7
22	10 13	4	P.R	247	61.5	270	61.5	354.0	+51.1	348.6	+41.0
23	16 20	1	P.R	258.5	37.5	265	22	20.6	+34.0	29.3	+19.5
24	16 41	2	O.P.R	222	23.5	222	16	62.6	+48.7	68.6	+43.0
25	27 26	2.3	O P	254	32.5	246	24	30.8	+33.7	44.1	+33.5
26	28 16	3	O	146.5	34	134.5	30	206.7	+61 4	212.9	+51.0
27	30 6	1	O.P	286	26	285	20.5	15.5	+ 9.3	19.7	+ 5 7
28	30 55	1	P.R	262.5	62	298.5	67.5	355.2	+44.3	338.8	+34.5
29	33 41	2	O.P	222	62.5	213	55	357.9	+62.9	14.3	+68.7
30	36 26	2	O	177.5	33	164.5	26	143.9	+74.6	170.1	+64.7
31	41 7	3	O	186.5	38	175.5	29	109.9	+78.7	149.0	+70.5
32	13 45 11	3	O.P	198	57	185	50.5	2.5	+76 0	11.6	+86.0

Nr. 4 Schweif durch 5ˢ bis 6′ sichtbar.
» 25, 29 und 30 sehr schnell.

1869. August 2. Wien.

Beobachter: Prof. v. Oppolzer und Prof. Felgel.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	11 4 36	6	O	255	16	258	14	27.8	+21.8	27.1	+18.4
2	15 45	2	.	300	29	289	24	349.9	+ 4.0	0.8	+ 6.0
3	11 23 58	3.4	O.F	236	33	245.5	30	31.5	+45.9	27.8	+37.7
4	12 0 26	4	.	202	36.5	205	31	69.5	+70.1	74.8	+64.5
5	4 10	1*	.	170	30	185	28	159.0	+70.2	119.9	+69.5
6	10 0	3	F	186	63	180	71	324.4	+74.9	314.0	+67.2
7	12 18 35	2	O.F	165.5	46.5	161	40.5	221.9	+80.0	68.8	+74.4

Die Beobachtungen durch theilweise Bewölkung des Himmels beeinträchtigt.

1869. August 4. Wien.

Beobachter: Prof. v. Oppolzer und Palisa.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	10 14 26	2	O	137.5	24	130.5	15	176.6	+48.8	175.2	+37.7
2	18 11	6	O	219.5	45.5	221.5	48	8.9	+63.2	2.8	+62.6
3	25 51	6	O.P	178	34	171	27	116.8	+75.7	131.5	+67.8
4	38 26	6	O	240 5	47	253.5	39	1.3	+50 3	4.2	+38.0
5	10 39 16	6	O	178.5	25	168.5	19	116.8	+66.7	135.1	+59.3

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
6	10 45 24	6	P	180.5	41	171.5	39	111.9	+82.7	151.7	+78.9
7	10 57 21	3	O.P	231	57.5	223	50.5	351.3	+58.4	6 8	+62.3
8	11 5 26	5	P	239.5	55	236.5	52	356.2	+53.6	2.0	+54.5
9	21 48	6	O	263.5	14	254.5	12	29.1	+14.7	37.3	+19.2
10	22 59	1	P	270.5	61	280.5	47	344.4	+40.4	353.9	+27.6
11	28 6	3	O.P	224.5	66	247.5	61.5	341.6	+60.9	350.1	+51.0
12	34 10	5	O	190.5	47	180.5	39	42.9	+82.8	124.6	+80.8
13	37 13	1	P	296.5	60	337.5	58	329.0	+29.8	330.2	+17.7
14	39 36	2*	P	190.5	26	188.5	20.5	164.3	+66.3	111.5	+61.5
15	43 26	3	O	214.5	15	218 5	11	76.9	+46.4	75.4	+40 9
16	50 16	2	O.P	235	57	253	64	5.0	+56.5	350.9	+49.1
17	52 59	4	O	192.5	67	177.5	56	336.1	+70.1	301.6	+82.0
18	11 53 41	1	P	199.5	30	189 5	28	85.5	+66.4	108.4	+68.5
19	12 3 31	2	O.P	167.5	24	155.5	19.5	161.1	+63 8	91.3	+55.2
20	6 47	4	O	244.5	21	249.5	20	49 4	+32.4	46.3	+28.3
21	9 36	3	O	219.5	55	236.5	47	15.3	+64.9	25.9	+52.8
22	20 28	4	O	152.5	34	145.5	28	204.0	+65.1	203.9	+56.6
23	23 51	4	O.P	149.5	47.5	158.5	31.5	239.6	+69.7	192.1	+66.7
24	34 2	3	O	204.5	16	201.5	13	101.6	+52.1	107.9	+50.6
25	39 13	4	O	154.5	33.5	157.5	26	205.1	+65.9	189.9	+61.6
26	39 56	2	O	188.5	20	185.5	14	126.8	+61.0	134.0	+55.4
27	44 36	2*	.	231	46	273	49	38.9	+55.9	15.8	+32.7
28	46 51	3	O.P	184.5	14.5	177.5	12	137.4	+56.0	149.4	+53.7
29	52 36	3	O	169.5	20	159.5	18	167.2	+60.6	182.7	+55.5
30	54 26	.	P	226.5	51	232.5	39	33.9	+60.3	50.9	+51 7
31	12 58 26	2	O.P	164.5	23.5	156.5	20.5	180.1	+62.4	190.6	+56.5
32	13 2 36	3	O	170.5	12	165.5	8	164.7	+52.9	171 0	+48.0
33	6 11	1	O.P	215 5	38	208.5	29	68.5	+62.4	91.0	+60.9
34	9 21	1	P	305.5	40	283.5	38	10.2	+10.5	25.4	+19.6
35	10 26	1	O.P	267.5	52	294.5	48	21.7	+37.2	12.0	+21.6
36	15 21	3	O.P	300.5	55.5	262 5	54	5.0	+25.0	22.8	+40.8
37	35 56	3	O	163 5	44	155.5	38	233.5	+77.9	226.7	+69 6
38	37 51	4	O	282.5	46	292.5	45	26.8	+25.8	19.1	+20.3
39	13 50 30	.	.	209	41	203	33	79.8	+68.3	104.3	+67.1

Nr. 1 rasch heller werdend.
» 10 röthlich.
» 11, 17 und 21 nebelartig.
» 15 und 23 langsame Meteore.
» 36 flog durch β Andromedae.

Nr.	Mittlere Wiener Zeit			Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
						A	H	A	H	AR.	Decl.	AR.	Decl.

1869, August 5. Wien.

Beobachter: Prof. Felgel und Palisa.

Nr.	h	m	s	Grösse	Beobachter	A °	H °	A °	H °	AR. °	Decl. °	AR. °	Decl. °
1	10	49	42	3	P	226	35	214	31	31.0	+53.8	48.2	+59.1
2		55	56	2	P	161	74	188	74	287.1	+62.9	303.5	+64.0
3		56	1	2	W	161	43	145	30	194.2	+75.8	187.1	+57.8
4		57	40	4	P	192	76	320	80	305.0	+61.8	307.3	+40.2
5	11	5	2	3	P	191	56	173	60	337.5	+79.7	284.4	+77.5
6		14	59	2	F	244	44	254	44	13.8	+46.7	8.7	+40.5
7		26	10	2*	P.F	277.5	33.5	287.5	27.5	7.5	+19.8	5.0	+ 9.5
8		26	52	3	P	270	59	272	53	348.2	+39.7	353.8	+35.6
9		34	57	2	F	192	27	....	....	100.1	+66.9	.	.
10		42	1	3.4	P.F	196.5	52.5	189	50.5	11.6	+78.6	15.3	+83.7
11		45	9	2	F	262	69	267	62	342.0	+46.8	350.2	+42.4
12		50	13	1	F	230	44	231	41	30.0	+55.7	34.1	+53.7
13		51	49	4	P	202	40	208	36	61.9	+72.3	62.9	+66.1
14		55	50	4	P	118	73	119	45	287.8	+53.6	242.7	+49.2
15		56	24	2	P	149	42	129	33	219.3	+67.5	220.9	+49.3
16		57	44	2*	F	277	41	291	35	9.9	+25.3	5.8	+13.5
17	11	59	40	3*	P.F	227.5	57.5	194.5	69.5	8.0	+60.6	327.7	+67.6
18	12	3	33	1	P	167	27	157	23	165.5	+66.6	179.5	+59.0
19		8	36	1*	F	268	46	293	38	13.0	+33.5	5.2	+14.7
20		10	7	4	F	223	19	225	15	71.8	+44.8	73.2	+40.4
21		14	8	6	P	165	46	152	44	221.4	+79.6	226.2	+70.2
22		19	2	3.4	P	161	27	170	19	180.9	+64.2	158.2	+59.7
23		19	32	1	P	92	42	75	33	259.3	+31.1	262.3	+15.2
24		23	34	2	P	167	22	161	19	166.7	+61.8	174.7	+57.0
25	12	24	36	4	P	175	32	162	29	155.5	+73.4	182.9	+66.4

Nr. 2 langsam; röthlich
» 9 Mitte einer sehr kurzen Bahn.
» 13 und 14 nebelartig.
» 22 langsam.

1869. August 11. Wien.

Beobachter: Prof. v. Oppolzer und Prof. Felgel.

Nr.	h	m	s	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	11	23	34	2	F	328.5	25.6	344.5	24.6	340.1	—11.0	325.8	—16.0
2		29	4	1*	O	198	33	189	29.5	84.5	+69.7	109.2	+70.1
3		32	24	2*	O	247	38	266	33	29.5	+41.7	22.6	+26.4
4		35	52	4	F	19.5	45.6	28.5	37.6	300.7	+ 5.3	292.1	— 0.6
5	11	36	40	3	F	38.5	60.6	48.5	44.6	295.1	+23.1	281.5	+12.0

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
6	11 37 53	2	F	287.5	74.6	306.5	61.6	334.9	+41.7	340.6	+27.8
7	38 6	3	O	144	58(:)	126	53(:)	263.1	+66.7	253.7	+56.2
8	42 38	1*	F	52.5	44.6(:)	58.5	35.6(:)	280.4	+13.5	271.4	+ 8.6
9	46 50	2*	O	173	38(!)	156	31(!)	166.2	+78.6	192.5	+65.0
10	48 34	4	O	154	43	156	33	221.2	+71.1	196.1	+66.5
11	11 59 0	2	O.F	230	63	217	52	2.9	+59.2	27.1	+65.8
12	12 1 14	3	O	167	21	156	16	166.3	+60.9	180.4	+52.3
13	1 49	2	F	244.5	30.6	254.5	26.6	46.4	+38.8	43.1	+29.6
14	3 59	3	O	195	69	.....	....	335.8	+68.0	.....	......
15	5 26	3	O	220	38	218	26	56.3	+59.4	74.9	+53.0
16	7 47	3	O.F	264.7	34.8	276.8	30.8	30.9	+28.4	26.5	+18.3
17	16 48	4	O	226	57	229	64	19.4	+61.4	5.3	+59.5
18	28 38	1	F	260.5	51.6	272.5	51.6	21.7	+40.7	16.5	+34.5
19	30 28	4	O	112	39	92	28	253.8	+41.6	256.3	+21.7
20	31 39	3	F	288.5	56.6	.....	....	5.7	+30.4	.....	......
21	36 39	6	O	170	45	152	43	218.2	+82.4	235.1	+69.8
22	38 24	3.4	O	176	20	.....	....	158.0	+61.6	.....	......
23	38 59	2*	O	166	32	156	30	188.4	+70.6	205.6	+64.2
24	41 26	2*	O	143	49	129	45	256.7	+65.8	255.0	+55.5
25	45 44	♃	F	.	.	234.4	5.8	.....	......	86.1	+27.4
26	48 9	.	F	295.5	55.6	....	....	7.6	+26.9	.....	......
27	48 34	2	F	56.5	22.6	54.5	18.6	282.1	— 3.2	281.5	— 7.5
28	50 59	3*	F	165.5	60.6	....	....	304.4	+75.2	.....	......
29	52 2	1*	O	116.7	46	99.7	32	265.1	+48.1	260.0	+29.4
30	57 53	3	O	143.7	26	138.7	19	219.9	+54.0	218.3	+45.8
31	59 9	3*	O	115.7	43	106.7	37	263.5	+46.0	262.0	+37.0
32	12 59 18	2*	F	279.5	42.6	285.5	40.6	28.6	+25.0	26.8	+20.4
33	13 0 45	4	O	135.7	42	142.7	36	251.2	+58.5	235.5	+60.1
34	1 39	2	O	225.6	61.5	220.6	73	21.2	+61.4	359.6	+60.0
35	3 29	4	O	172.6	49	169.6	40	258.2	+85.0	202.5	+78.9
36	5 4	2*	O	123.6	27	110.6	23	241.8	+41.9	248.0	+30.5
37	6 29	1	O.F	118.7	41	108.7	34	261.3	+46.9	259.7	+36.5
38	10 3	2	O	140.6	20	134.6	13	220.3	+47.6	220.7	+38.5
39	10 40	3	O	164.6	17	162.6	14	185.5	+56.5	186.8	+52.9
40	11 57	4	O	129.6	31	117.6	24	242.9	+48.4	245.4	+35.8
41	13 23	5	O.F	183.6	51	194.6	41	17.2	+86.4	99.4	+77.4
42	14 58	6	O	162.6	35	161.6	24	210.1	+71.6	196.9	+61.7
43	16 39	3	O	154.6	39	165.6	32	232.3	+69.6	198.9	+70.4
44	17 5	4	O	182.6	21	182.6	15	154.6	+62.7	155.3	+56.7
45	13 20 38	4	O.F	142.2	61.	148.6	60	295.5	+65.2	295.4	+68.5

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
46	13 21 18	1*	O	147.6	48	122.6	34	262.5	+68.5	254.1	+45.6
47	21 57	2	O	155.6	69	130.6	65 (:)	319.6	+66.0	302.2	+59.2
48	22 21	3	F	140.7	45	132.7	40	259.1	+63.2	255.3	+55.7
49	24 6	3	O	134.6	23	121.6	16	232.9	+46.2	238.4	+32.7
50	25 57	2*	O	112.6	48	101.6	43	278.1	+46.4	277.7	+37.3
51	26 39	2	F	114.7	53	106.7	48	270.9	+49.7	280.8	+43.0
52	26 51	4	O	184.6	49	170.6	46	268.8	+86.9	236.8	+83.1
53	31 12	2	O	130.6	31	115.6	19	247.0	+49.1	247.5	+31.0
54	32 43	1*	O	152.6	18	144.6	12	209.7	+52.5	214.9	+43.3
55	35 15	3.4*	O	240.6	19	241.6	9	83.3	+33.6	90.2	+25.5
56	38 39	2	O	155.6	23	159.6	17	211.4	+58.3	200.3	+54.6
57	40 4	4	O	169.6	48	157.6	26	257.7	+83.1	212.0	+61.7
58	40 56	4*	O	135.6	21.5	127.6	16	234.4	+45.8	237.3	+36.6
59	47 41	1*	O.F	233.6	30.5	236.6	25	80.9	+46.0	84.2	+40.4
60	49 54	2*	O	123.6	47	108.6	38	278.0	+52.8	274.7	+38.8
61	50 43	2*	O	160.6	60	145.6	59	311.8	+73.7	299.4	+67.3
62	53 20	3	F	128.7	54	134.7	51	288.8	+58.0	281.6	+61.0
63	54 59	3	F	151.7	37	.....	....	241.1	+66.5	.....	......
64	56 25	1.2	F.O	147.6	53.5	142.6	45	286.8	+69.0	266.5	+64.5
65	57 17	4*	O	248.6	36.5	250.6	28	66.5	+39.8	73.4	+33.1
66	58 42	4	O.F	176.6	30.5	172.2	25.5	179.7	+72.2	187.8	+66.5
67	13 59 21	2*	O	158.6	18	150.6	14	207.7	+55.1	215.9	+48.1
68	14 6 5	2	O	268.6	71	18.6	73	19.6	+45.3	345.6	+31.9
69	12 39	1	F	40.7	21	38.7	19 (:)	314.8	—11.8	316.0	—14.4
70	16 49	4	O	196.6	26	194.6	20	138.6	+64.3	147.0	+59.5
71	18 47	3	O	161.6	21	158.6	11	210.3	+59.0	208.1	+48.7
72	19 20	2	O	0.6	17	2.6	10	354.7	—24.8	352.3	—31.8
73	20 11	2	O	126.6	31	115.0	18	262.4	+46.4	258.9	+30.3
74	22 41	1*	O	311.6	22	206.6	10	121.2	+53.7	137.1	+45.8
75	25 23	4	O	231.6	32	235.6	26	90.4	+48.3	93.6	+41.8
76	25 39	2	O	189.6	53	178.6	48	44.8	+82.2	254.1	+88.9
77	27 49	1*	O	162.6	36	167.6	33.5	230.5	+72.3	214.5	+72.6
78	29 30	4	O	188.6	57	181.6	49	25.0	+79.8	47.1	+88.7
79	29 58	5	O	201.6	51	195.6	46	68.7	+75.8	94.0	+79.2
80	32 29	4	F	50.7	31	49.7	23	316.9	+ 1.3	313.7	— 6.0
81	35 32	2*	F	140.7	44	143.7	36	275.4	+62.8	258.2	+60.8
82	36 19	2	F	262.6	52	291.6	52	43.6	+29.8	39.1	+25.9
83	37 47	2	F	97.7	19	93.7	14	277.4	+19.1	276.8	+12.9
84	14 41 4	2*	F	88.7	29	84.7	23	291.7	+20.3	290.1	+13.5

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.

Nr. 7 und 53 nebelartig.
» 10, 35 und 57 rasche, Nr. 19, 21, 40, 52 und 66 sehr rasche Meteore, die nicht dem Perseusradianten, sondern einem nördlichen (in der Nähe des Poles?) entströmten.
» 14 Bahnmitte eines längeren Perseïden.
» 20 Bahnmitte eines ziemlich kurzen Meteores.
» 22 Mitte eines Perseïden, der in Wolken verschwand.
» 25 Endpunct einer hübschen kleinen, aus den Wolken hervorbrechenden, den Perseïden angehörigen Feuerkugel.
» 26 Einstellung auf die Mitte des Schweifes eines Perseïdenmeteores.
» 28 Bahnmitte eines kurzen, nicht zur Radiation des Perseus gehörenden Meteores.
» 41 gekrümmte Bahn.
» 44 Um 13^h 27^m trat eine kleine Gruppe von Meteoren ein, indem ausser den beobachteten fast gleichzeitig noch mindestens 5 andere sichtbar wurden.
» 46 röthlich-gelb.
» 54 und 77 weiss.
» 62 langsam.
» 63 Bahnmitte eines kurzen, raschen Meteores.

Der Meteorschauer trug genau denselben Charakter wie im Jahre 1867 und wie er bei den Beobachtungen jenes Jahres, August 10., geschildert ist.

1869. August 11. Mölk.

Beobachter: Palisa.

Nr.	Mittlere Wiener Zeit (h m s)	Grösse	Beobachter	Anfang A °	Anfang H °	Ende A °	Ende H °	Anfang AR. °	Anfang Decl. °	Ende AR. °	Ende Decl. °
1	12 19 50	1*		185	51	157	47	11.7	+85.7	238.6	+74.5
2	27 2	2*		203	35	191	34	85.6	+68.5	112.2	+73.6
3	34 28	1*		297	45	321	39	9.6	+18.2	357.3	+ 3.8
4	38 38	1*		213	49 (!)	201	49.5	44.6	+68.4	45.9	+76.1
5	41 25	1*		191	57	168	62	2.7	+79.0	308.1	+74.6
6	42 26	3		272	55 (!)	283	54 (!)	15.6	+36.7	12.0	+30.9
7	44 58	2*		259	37 (!)	272	34 (!)	40.5	+33.4	35.1	+23.4
8	46 1	3		245	32 (!)	247	29 (!)	54.5	+39.4	56 1	+36.2
9	48 6	♀*		269	40 (!)	293	32	32.8	+29.2	24.0	+10.0
10	51 2	2		319	38	315	26	3.4	+ 3.5	11.9	— 5.5
11	12 59 13	2		269	31	282	27	43.0	+23.2	37.4	+12 4
12	13 1 40	1		249	43 (!)	257	41 (!)	44.0	+43.1	41.9	+37.1
13	4 55	4		232	15	228	10	85.2	+36.2	92.8	+34.6
14	5 35	3		287	75	267	60	355.3	+42.0	17.6	+41.5
15	6 58	2		236	39	220	36	57.8	+49.4	73.9	+58.3
16	16 48	3		285.3	56	266 3	48	17.7	+31.3	33.9	+35.6
17	20 36	3		224.3	58	239.3	57	32.3	+62.2	32.7	+54.1
18	21 21	1*		193.3	54 (!)	165.3	50	29.7	+79.8	265.9	+80.4
19	22 15	2		195.3	59	176.3	60	14.3	+75.9	331.4	+78.0
20	13 25 43	♃		308.3	33	306.3	19	22.1	+ 3.4	30.9	— 7.5

Nr	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
21	13 26 58	2		267.3	32 (!)	278.3	26	50.2	+24.8	47.5	+13.8
22	29 53	.		305.3	66	337.3	60	4.8	+31.6	353.7	+19.7
23	45 27	1		324.3	36 (:)	341.3	26 (:)	13.9	0.0	3.0	−13.9
24	47 43	1		243.3	27 (!)	247.3	17 (!)	76.0	+37.2	81.5	+27.6
25	49 12	3		297.3	50	286.3	39	24.7	+21.9	38.7	+18.9
26	49 53	1		201.3	71	137.3	75	3.3	+65.1	327.6	+58.0
27	50 54	4		194.3	60	202.3	58	17.2	+75.6	32.6	+73.5
28	53 40	2		217.3	24	213.3	16	103.8	+51.8	115.8	+47.8
29	54 58	1*		196.3	47 (!)	172.3	40	78.2	+79.1	204.2	+80.2
30	13 56 25	.		214.3	62	193.3	56	30.3	+66.4	30.1	+78.7
31	14 4 26	1		301.3	39 (:)	313.3	31 (:)	33.2	+11.4	29.1	− 0.5
32	5 14	3		346.3	38	10.3	27	1.4	− 2.9	341.1	−14.2
33	6 8	2		314.3	58	341.3	55 (:)	15.2	+22.7	1.9	+14.5
34	10 56	4		242.3	48	240.3	46	58.1	+49.4	61.8	+49.9
35	12 3	2		302.3	49	323.3	44	28.4	+19.1	18.1	+ 7.7
36	14 20	1*		266.3	44 (!)	280.3	33 (!)	52.2	+33.2	53.0	+17.8
37	15 41	2		299.3	36	312.3	30	39.1	+ 9.9	34.1	− 1.0
38	18 38	2*		306.3	79	9.3	68	5.8	+41.0	350.1	+26.4
39	19 23	2		327.3	30	343.3	22	22.3	− 6.5	10.4	−18.2
40	20 9	2		289.3	52 (!)	319.3	47	35.1	+26.7	21.4	+11.6
41	25 28	4		260.3	37	265.3	36	64.8	+32.5	62.7	+28.7
42	29 25	1		269.3	43 (!)	277.3	37 (!)	55.2	+30.9	55.7	+22.3
43	31 58	2*		262.3	44	268.3	41	58.7	+35.5	58.3	+30.2
44	35 33	1*		194.3	57 (!)	163.3	50	37.3	+77.6	72.8	+79.1
45	36 45	3		266.3	67	281.3	70	31.9	+44.7	25.1	+40.9
46	38 19	1		179.3	40	169.3	37	181.9	+81.7	217.4	+76.4
47	43 23	2		349.3	59	7.3	46	6.0	+17.6	355.1	+ 4.4
48	45 52	3		340.3	32	316.3	27	17.6	− 7.9	39.0	− 5.3
49	51 2	2		202.3	27 (:)	205.3	21	134.6	+62.6	136.3	+56.1
50	52 21	4		206.3	77	166.3	79	14.0	+59.5	357.7	+58.8
51	57 2	.		145.3	47	138.3	33.5	283.9	+66.9	263.8	+55.7
52	58 24	3		134.3	61	131.3	57	317.7	+61.4	309.5	+60.0
53	59 13	3		292.3	27 (:)	299.3	18 (:)	60.3	+ 6.3	60.5	− 4.6
54	14 59 46	3		254.3	41 (!)	243.3	36.5 (!)	72.9	+38.6	84.2	+43.1
55	15 0 35	1*		288.3	56 (!)	305.3	49 (!)	42.4	+30.0	38.8	+18.0
56	4 21	1*		312.3	36	325.3	24	42.4	+ 4.3	37.6	−11.4
57	5 58	1*		218.3	41 (!)	215.3	32 (!)	96.4	+62.0	114.2	+58.3
58	9 44	1		307.3	41	318.3	29	44.5	+10.6	50.0	− 0.1
59	11 39	3		221.3	42	219.3	37	93.9	+60.4	104.0	+59.3
60	15 12 38	2		274.3	27 (!)	277.3	21 (!)	76.0	+17.0	78.0	+10.6

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
61	15 14 25	2		259.3	35 (!)	270.3	27	79.5	+31.9	79 6	+19.5
61	15 19	2		286.3	75	28.3	78	27 9	+42.1	1.2	+37.4
62	15 16 54	2		70.3	33	68.3	22	314.5	+12.6	309.0	+ 3.0

Nr. 10 Daner 2ˢ.
„ 16 geschlängelte Bahn; ging durch Az. = 281,3 H = 5.3.
„ 20 schönes bläuliches Meteor von 2ˢ Dauer.
„ 22 Einstellungen des Schweifes eines Perseidenmeteores. Ebenso Nr. 30 und 51.
„ 26 durch Wolken gesehen.
„ 48 und 61 Dauer 1ˢ.
„ 56 und 57 gelbliche Meteore durch Nebel gesehen.
Nebst den beobachteten noch eine ziemlich grosse Zahl anderer Meteore gesehen.

1869. August 11. Brünn.

Beobachter: Prof. v. Niessel.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	11 28 58	♃*		227	57.7	230.0	70.7	7.6	+61.5	341.7	+58.6
2	41 35	.		7.7	59	31.5	39.4	311 8	+18.4	292.?	+ 3.0
3	43 12	3		350 5	39.4	22.5	20.4	323 8	— 0.9	294.2	—17.5
4	11 46 2	.		315.7	66.0	.....	....	336 3	+30.0	.	.
5	12 1 35	5		325.0	65.7	347.0	54.2	336.6	+27 9	328.7	+13.8
6	5 25	1*		296.0	53.7 (!)	261.0	46.7(:)	358.4	+26.3	22.3	+38.4
7	13 57	2*		295 0	76.2 (!	344.0	64.7	341.0	+42.1	331.6	+24.6
8	18 52	4		313.0	53.2 (!)	301.5	50.7	351.4	+22.6	1.0	+21.8
9	22 52	3		261.0	67.7	290.0	62.7 (:)	0.1	+47.7	357.6	+34.5
10	27 8	.		335.5	31.7 (!)	348.0	13.7 (!)	348.3	— 6.2	340.4	—26.0
11	28 52	.		309.5	52	331.5	45.7	358.3	+19.9	347 6	+ 8.1
12	31 54	5		283.5	47.7	313.5	34.7	16.0	+27.2	5.5	+ 3.6
13	34 27	.		356.5	34.7	1.5	23.7	332.2	— 6.0	328.8	—17.0
14	38 42	.		36.5	65.2	50.0	47.7	314.2	+27 9	297 9	+16.2
15	41 25	.		63.5	57.7	58.5	29.7	298.1	+29.0	282.9	+ 3.7
16	44 57	1		331.5	45 7 (!)	352.5	21.7(!)	351.7	+ 8.1	339.2	—18.7
17	48 7	♀		333.0	43.2 (!)	355.0	23.7(!)	352.1	+ 5.6	337.5	—17.0
18	49 8	.		68.5	46.7 (:)	....	....	289.2	+22.9	.	.
19	12 52 3	♃		65.5	51.7	65.8	34.4	295.3	+25.3	283.5	+12.0
20	13 3 48	4		292.0	47.7	313.0	37.7	19.4	+23.4	12.3	+ 6.5
21	6 27	.		79.5	54.7	66.5	24.7	294.4	+33.4	280.3	+ 4.6
22	13 23	.		30.5	54.2	355.5	59.2	321.1	+16.6	341.5	+18.6
23	15 5	.		336.5	40.7	351.5	22.7	357.1	+ 2.3	347.8	—17.5
24	16 48	.		16.0	37.7	.....	....	327.3	— 1.9	.	.
25	13 18 4	.		10.5	37.7	39.0	20.7	331.9	— 2.6	303.2	—12.0

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
26	13 21 57	3		28.5	49.7	43.5	41.7	322.8	+11.9	309.9	+ 8.7
27	25 42	2		351.5	22.7 (!)	345.5	9.7 (!)	350.2	—17.5	358 6	—20.7
28	29 50	3		23.0	53.2	55.5	31.0	329.3	+14.4	298.0	+ 4.2
29	38 49	.		49.2	34.7	64 7	30.7	306.5	+ 4.8	293.7	+ 8.4
30	40 55	.		114.7	36.2	101.7	15.7	266.4	+42.0	257.7	+19.4
31	44 56	2		77.7	40.7	69.2	25.7	293.5	+22.8	288.8	+ 6.9
32	47 24	.		58.7	41.7	49.2	21.2	306.4	+14.6	302.5	— 7.0
33	49 51	.		50.7	45.5	.....	....	314.1	+14.6	.	.
34	50 45	.		34.7	61.7	35 7	37.2	331.0	+24.3	320.7	+ 2.0
35	56 11	.		83.7	34.7	74.0	19.7	288.2	+21.8	284.5	+ 4.9
36	13 57 17	.		296.0	47.7	313.5	33.7	30.6	+21.6	27.3	+ 2.8
37	14 2 41	.		343.7	63.2	359.7	32.2	359.4	+23.3	351.9	— 8.5
38	14 16	.		342.5	48.7	358.2	37.2	5.9	+ 9.2	355.6	— 3.4
39	15 47	.		65.5	45.7	62.7	21.7	311.9	+20.7	298.8	0.0
40	18 35	3		37.7	46.2	34.5	25.7	329.9	+11.0	324.3	— 8.9
41	19 56	2		99.1	37.7	85.0	21.7	296.8	+33.3	283.8	+13.1
42	25 26	.		321.0	66.7	325.5	47.7	13.8	+29.7	20.0	+11.5
43	25 53	.		90.5	36.2	88.7	26.4	292.6	+26 9	285.7	+18.8
44	14 27 47	2		111.7	58.2	101.1	61.7	307.5	+50.4	315.1	+46.6

Nr. 6 röthlich.
» 8 roth.
» 9 weiss.
» 18 Mitte des Schweifes eines Perseïdenmeteores; ebenso Nr. 24.
» 27 beschrieb eine Schlangenlinie, deren Amplitude etwa die Hälfte des Monddurchmessers betrug.
» 28 röthlich.

1869. August 12 Wien.

Beobachter: Prof. v. Oppolzer.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	10 53 8	2		148.3	41.5	144.3	27.5	209.6	+66.9	190.5	+55.6
2	11 2 28	1.2*		126.3	26.5	115.3	17.5	209.1	+43.4	210.0	+29.9
3	7 7	4*		111.3	26.5	104.3	23.5	221.7	+33.5	224.5	+26.7
4	8 24	3		294.3	38.5	284.3	36.5	355.9	+14.4	3.5	+18.0
5	21 20	6		220.3	54.5	213.3	68.5	12 3	+64.3	338.4	+63.8
6	24 8	2		225.3	39.5	216.3	34.5	40.3	+56.5	55.7	+59.7
7	30 48	3		209.3	54.5	204.3	65.5	13.0	+70.7	342.0	+68.4
8	33 44	4		177.3	38.5	164.3	34.5	147.9	+80.1	180.7	+72.0
9	39 40	5		171.3	23.5	164 3	21.5	154.7	+64.4	166.3	+60.6
10	11 45 55	3		229.3	35.5	234.8	35.0	48.7	+51.7	45.1	+48.4

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
11	11 52 0	2*		216.3	24.5	210.3	11.5	75.8	+52.8	94.3	+45.4
12	54 58	4		138.3	57.5	122.3	57.5	266.4	+63.8	267.6	+55.2
13	57 13	2.3		118.3	75.5	60.3	64.5	299.2	+53.3	294.4	+32.1
14	11 59 52	5		211.3	52.5	202.3	58.5	27.4	+67.3	5.3	+73.3
15	12 0 8	3.4		193.3	41.5	154 3	41.5	80.6	+78.3	220.4	+70.8
16	3 49	1.2*		268.3	64.5	289.3	60.5	358.4	+42.9	356.3	+32.6
17	10 30	4		248.3	44.5	257.3	43.0	32.4	+44.1	28.8	+37.9
18	14 57	2		308.3	32.5	297.3	20.5	6.6	+ 2.9	21.6	− 1.5
19	25 49	3		219.3	57.5	216.3	48.5	21.4	+64.8	43.4	+66.0
20	25 58	4		219.3	54.5 (:)	203.3	56.5 (:)	28.0	+64.9	18.8	+73.5
21	36 6	2*		248 3	37.5	251.8	36.5	46.3	+40.4	45.2	+37.5
22	38 35	2*		227.3	44.5	221.3	30.5	49.5	+57.5	75 1	+54.0
23	40 9	3		245.3	55.5	236.3	46.5	25.6	+50.4	42.2	+52 6
24	44 53	4		185.3	22.5	185.3	17.5	141.0	+64.0	141.6	+59.0
25	47 13	2*		127.3	46.5	114.3	36.5	261.0	+55.1	254.7	+41.7
26	49 38	.		Siehe Bemerkungen.							
27	51 17	2		111.3	35.5	111.3	24 5	256.6	+39.2	246.2	+31.5
28	53 40	4		256.3	36.5	266.3	31.5	46.7	+34.7	44.9	+25.1
29	55 3	2		46 3	46.5	50.3	33 5	304.4	+13.0	294.9	+ 3.4
30	12 58 42	2.3*		104.3	32.5	93.3	24 5	260.0	+32.8	260.6	+19.2
31	13 0 2	4		199.3	30.5	205.3	25.5	109.3	+66.8	104.4	+59.8
32	4 31	3		91.3	39.5	77.3	30.5	275.6	+29.2	277.1	+14.7
33	4 43	4		114.3	42.5	101.3	31.5	265.5	+45.0	262.6	+30.2
34	8 18	2*		247.3	22 5	256.3	16.5	68.9	+31.4	66 9	+21.2
35	12 55	6		236.3	17.5	239.3	12.5	83.2	+35.1	84.6	+29.4
36	13 14	3*		216 3	27.5	214 8	22.5	92.7	+55.0	100.6	+52.2
37	24 30	3		265.3	40.0	275.3	37.5	45.9	+31.3	42.2	+23.7
38	30 4	4		4.3	50.5	31.3	47 5	341.1	+ 8.8	323.0	+ 9.5
39	38 15	2		307.3	66.5	335.3	63 5(:)	7.7	+31.4	357.7	+23.4
40	47 18	3*		187.3	57.5	169.3	55.5	11.3	+79.7	312.2	+80.3
41	13 54 28	5		179.3	48.5	169.3	46.5	268.4	+89.3	252.1	+82.6

Nr. 3 schnelles Meteor.
» 21 bläulich.
» 22 voran stecknadelkopfähnlich verdickt.
» 25 Schweifspuren, dem freien Auge durch mehr als 10^s sichtbar.
» 26 beschrieb um den Stern 4.5 $\alpha = 15^h$ $\delta = +85^0$ einen Halbkreis mit einem Radius von etwa $\frac{1}{2}^0$.
» 30 gelblich.
» 31 und 32 gekrümmte Bahnen.
» 36 gelb.
» 38 und 39 sehr schnelle Meteore.

Beobachtet bis gegen $14\frac{1}{4}^h$, nach Mitternacht fing sich jedoch der Himmel an zu umwölken, und war seit 14^h stark umzogen.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
				1869 August 12. Mölk.							
				Beobachter: Palisa.							
	h m s			°	°	°	°	°	°	°	°
1	10 34 20	5		255.3	57	275.3	57	348.0	+45.8	341.1	+36.2
2	43 35	3		246.3	61	282.3	70	346.7	+51.3	327.3	+40.6
3	49 48	4		275.3	40	306.3	36	0.4	+25.5	343.8	+ 6.7
4	51 9	3		222.3	51	216.3	58	11.1	+62.7	355.0	+66.5
5	51 50	2		194.3	46	171.3	35	40.5	+79.9	151.9	+75.5
6	55 46	3		298.3	70	355.3	68	326.3	+36.3	306.2	+26.3
7	10 59 53	2		293.3	37	292.3	32	354.3	+13.7	358.1	+10.3
8	11 1 36	3		294.3	71	266.3	79	327.8	+38.0	322.2	+47.8
9	7 10	1*		129.3	38	109.3	27	220.6	+52.5	222.6	+32.5
10	11 15	2		318.3	22	310.3	19	346.8	—10.5	354.9	— 9.5
11	15 38	2		233.3	53	250.3	63	10.5	+56.5	350.9	+49.9
12	23 19	1		325.3	57	338.3	65	330.3	+19.1	321.0	+24.5
13	30 50	3		237.3	36	246.3	38	37.5	+46.8	29.4	+42.0
14	30 55	1		280.3	41	301.3	39	7.5	+23.4	355.7	+11.4
15	36 1	2		321.3	52.5 (!)	311.3	56 (!)	337.7	+16.0	341.3	+21.9
16	36 46	1		298.3	58 (!)	290.3	60 (!)	346.3	+27.6	348.0	+31.9
17	38 6	3		245.3	40	243.3	35	29.5	+43.8	36.4	+42.2
18	45 7	2		299.3	65	345.3	59	342.5	+32.5	324.4	+18.0
19	49 2	2		342.3	55	332.3	61	327.9	+14.3	331.6	+21.5
20	49 35	1*		259.3	51 (!)	275.3	49 (!)	12.9	+41.0	7.7	+31.5
21	54 55	1*		213.3	58 (!)	187.3	69 (!)	10.2	+68.0	326.6	+69.0
22	56 36	1		353.3	30	343.3	18	325.5	—11.6	336.5	—22.1
23	11 58 52	2.3		305.3	49	332.3	46	354.8	+18.0	339.3	+ 7.2
24	12 0 5	3		213.3	36 (!)	205.3	37	64.4	+62.7	72.0	+68.4
25	3 48	2↯*		213.3	44	282.3	45	22.5	+35.5	11.0	+25.2
26	11 55	1.2		263.3	49	274.3	45	19.0	+37.8	17.4	+29.4
27	14 59	2		297.3	23	287.3	15	18.8	+ 0.5	31.2	0.0
28	37 9	2		261.3	61.5	248.3	56	11.2	+44.7	22.2	+49.1
29	38 40	2		246.3	28.5	238.3	20	56.2	+36.2	69.9	+35.6
30	40 7	2		285.3	71 (!)	286.3	66	354.7	+40.3	359.7	+37.2
31	47 11	2		179.3	61	135.3	59	330.8	+77.2	281.6	+62.1
32	49 19	3		263.3	38	279.3	30	39.0	+31.2	35.5	+16.2
33	55 11	2		359.3	57	356.3	46	334.6	+15.2	336.7	+ 4.3
34	55 31	3		285.3	43	301.3	38	23.9	+22.2	17.5	+10.6
35	12 57 10	2*		282.3	60.5	299.3	56.5	12.9	+35.3	7.2	+26.2

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
36	13 28 55	2		172.3	45	172.3	27	223.4	+83.9	180.8	+68.1
37	38 12	2		291.3	47	300.3	40	28.3	+22.3	27.6	+12.7
38	39 23	4		288.3	44	298.3	42.5	32.5	+21.5	27.6	+15.6
39	42 12	2		334.3	41	348.3	36	5.1	+ 2.1	355.3	— 5.1
40	42 14	2		321.3	37	332.3	34	15.9	+ 1.8	8.6	— 4.2
41	45 8	3		303.3	48	296 3	41	22.6	+17.9	31.2	+15.8
42	49 40	4		250.3	51	244.3	47	46 4	+46.1	54.2	+47.8
43	13 54 55	2		210.3	41	208.3	31	86.3	+67 3	107.4	+62.4

Nr. 5 Dauer $1\frac{1}{2}^s$.
» 10, 22 und 27 Dauer 1^s.
» 33 nebelartig.

1869. August 12. Semmering.

Beobachter Rosner.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
1	10 0 25	2		173.5	29.5	168.7	24.3	128.8	+71.3	135.6	+65.3
2	1 50	2*		220.7	59.2	237.7	75.5(:)	340.2	+63.6	312.1	+53.6
3	5 37	3		272.7	30.5	271.7	29.3	358.9	+20.3	0.4	+20.2
4	7 53	4		172.1	42.2	162.7	37 9	160.1	+82.2	172.0	+74.1
5	21 6	2		132.8	67.7	103.7	58.9	262.5	+59.1	250.3	+46.8
6	23 21	3*		265.6	37 9	277.1	30.5	1.4	+29.8	0.5	+17.6
7	38 17	3*		178.7	50.5	162.9	45.8	28[illegible].9	+86.9	208.3	+78.4
8	41 40	1		272.5	18.7	280.0	15.2	16.9	+12.1	13.6	+ 4.6
9	43 36	3*		193.0	54 7	186.5	51.2	345 6	+79.2	350.1	+84.3
10	49 48	3		249.0	43.4	260 7	39.4	11.5	+43.1	9 5	+33.7
11	51 53	3		215.3	14.5	179.7	22.7	70.2	+45.8	123.8	+65.1
12	57 8	1		306.8	30.5	319.5	27.2	348.9	+ 1.4	340.7	— 6.7
13	10 59 53	3		265.0	39.6	252.7	40.2	9.5	+31.0	15.8	+39.1
14	11 0 58	3		254 0	27.3	264.5	25.1	27.6	+30.3	24 0	+20.4
15	13 9	4		231.7	28.0	232.7	26.4	46.3	+45.6	47.1	+44.1
16	17 7	4		270.7	33.6	285.3	31.5	15.7	+23.6	7 9	+13.4
17	21 56	2		236.7	56.7	254.7	64.9	3.7	+55.0	347.9	+48.1
18	23 17	1		192.7	70.8	166.2	60 2	321.8	+66.0	284.4	+75.1
19	35 59	2		267.7	70.7	242 5	61.5	342.2	+44.9	358.8	+52.8
20	37 56	3		271.7	[illegible]4.7	278.9	12.9	34.1	+ 9.7	30.1	+ 3.5
21	44 14	2		233.5	37.5	234.9	36.3	41.7	+50.2	41.8	+48 6
22	45 50	3*		222.7	24.5	223.7	22.7	66.4	+49.2	67.2	+47.5
23	47 14	4		245.7	33.3	241.5	37.5	39.1	+39 7	37.3	+44.8
24	49 17	2		.....	...	209 7	22 8	.....	....	83.8	+55.9
25	11 49 19	3		245 1	49.1	262.7	34.8	21.1	+48.0	27.3	+29.5

Nr.	Mittlere Wiener Zeit h	m	s	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
						°	°	°	°	°	°	°	°
26	11	51	5	4		203.5	18.7	203.0	18.3	96.9	+55.3	98.1	+55.3
27		52	2	4*		214.0	15.3	204.7	11.0	86.2	+47.4	100.9	+47.9
28	11	54	56	1*		171 5	44 8	159.7	41.1	209.9	+82.9	213.2	+74.1
29	12	0	46	4		208.0	29.5	211.5	27.3	81.1	+61.9	79.0	+58.3
30		11	32	3		276.2	18.7	282.5	14.9	36.6	+ 9.8	34.6	+ 2.8
31		14	56	2*		288.7	26.0	277.1	22.5	23.1	+ 8.2	34 2	+12.0
32		16	8	4		241.7	54.5	253.7	68.1	20.9	+51.8	358.2	+49.1
33		27	16	4		280.9	70.1	239.4	65.9 (:)	354.1	+40.5	5.0	+54.4
34		30	48	3		123.7	78.5	106.7	51.8	312.6	+52.9	272.7	+44.6
35		36	43	2*		347.1	56.6	4.4	49.3	337.5	+14.7	327.2	+ 7.1
36		38	13	1*		258.7	21.5	265 5	17.3	53.4	+23.1	51.5	+15.8
37		40	5	2		178.5	64.1	186.7	54.5	328.6	+73.6	359.0	+82.0
38		46	33	3		253.7	40.1	264 1	36.1	42.0	+38.3	39.8	+29.2
39		50	12	4		247.7	28.5	254 7	25.5	58.5	+35.3	56.2	+28.6
40	12	53	43	4		241.5	31.9	248.5	26.6	59 9	+41.6	60.4	+33.6
41	13	24	33	4		242.7	30.4	252.7	26.5	68.2	+39.0	65.1	+30.6
42		29	37	2		235.2	16 1	233.7	15.3	88.8	+35.4	90.4	+36.0
43		32	45	3		261.8	37.5	271.4	27.3	51.5	+30.9	53.9	+19.0
44	13	45	23	2		43.8	61.0	62.1	40.5	325.7	+24.3	304.1	+13.7

Nr. 6 sehr langsam.
» 10 schwach gekrümmte Bahn.
» 24 Anfangspunkt übersehen.

1869. August 13. Wien.

Beobachter: Prof. v. Oppolzer, A. v. Littrow und später auch Prof. Felgel.

Nr.	h	m	s	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	10	56	28	3*	O.P	219.3	51.0	220.8	59.0	15.3	+64.6	356.8	+64.0
2		57	38	4	L	297.7	38	279.7	35	352.4	+12.4	5.9	+19.6
3		59	28	2*	L	356.7	43	346.7	38	309.6	+ 1.2	317.7	— 3.0
4	10	59	28	6	O.A	165 3	53.0	176.3	50.0	195.6	+79.6	357.3	+87.1
5	11	6	52	3.4	L	1.7	40	331.7	37	307.6	— 1.8	331.3	— 1.2
6		18	53	4	O	211 3	56.0	208.3	47.0	8.2	+69.4	35.0	+70.9
7		21	23	3*	O	281.3	50.0	294.3	41.5	358 9	+29.1	358.1	+16.7
8		23	32	3	O	298.3	75.0	153.3	67.0	330 5	+39.6	287.0	+66.8
9		27	21	2.3*	L	149.7	42 (:)	136.7	34 (:)	219.3	+67.9	216.4	+55.0
10		32	44	2*	L	49.7	37	77.7	29	277 8	+ 6.1	247.2	+ 6.1
11		36	58	1.2*	O	240.3	43.0	228.3	29.0	31.3	+48.6	56.1	+48.4
12	11	37	52	5	L	280.7	53.0	277.7	41.0	0.7	+31.4	12.4	+24.9

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
13	11 40 48	4	O	223.3	56.5	212.3	51.0	13.6	+62.7	27.7	+69.1
14	41 8	3.4	L	50.7	36	51.7	22	278.7	+ 5.6	270.7	− 5.9
15	46 17	6	O	136.3	41.0	134.3	34.0	232.5	+58.6	223.4	+53.7
16	50 43	3	O L	309.0	30.5	313.5	22.0	2.1	+ 0.8	2.8	− 8.3
17	53 52	1*	L	0.7	54	7.7	21	320.5	+12.2	313.1	−20.4
18	54 11	3	O	163.3	65.0	175.3	58.0	299.1	+71.1	307.1	+79.8
19	11 56 48	3	O.P	287.3	24.0	298.3	19.0	23.0	+ 6.9	18.0	− 3.3
20	12 0 16	2	L	78.7	28	77.7	18	259.5	+13.6	253.4	+ 5.4
21	2 57	2	O	278.3	21.0	273.3	19.0	32.8	+10.0	37.8	+11.8
22	4 13	2*	O	109.3	52.0	102.3	39.0	264.2	+45.5	254.6	+35.5
23	5 46	2	L O	143.3	62.5	152.5	59.5	282.7	+65.4	279.4	+70.7
24	7 23	2	O	148.3	24.0	.....	....	201.3	+55.3	.....	....
25	7 33	2	L	25.7	67	3.7	57	313.3	+26.9	322.8	+15.3
26	8 23	5	L	76.7	62	87.7	48	290.2	+35.9	282.2	+32.4
27	18 2	6	L	359.7	47(:)	352.7	21(:)	327.1	+ 5.2	334.2	−20.5
28	19 38	4	O	242.3	53.0	238.3	48.0	26.1	+51.3	34.9	+51.9
29	19 58	3*	L	338.7	43	2.7	32	342.8	+ 3.1	325.1	− 9.8
30	23 7	3	O	173.3	20.0	169.3	17.0	161.1	+61.3	167.2	+57.6
31	23 12	3	L	57.7	48	56.7	35	291.6	+18.4	284.5	+ 7.3
32	23 19	6	L	54.7	50	58.7	45	294.5	+18.9	289.2	+16.4
33	24 48	3	O	173.3	56.0	167.3	50.0	304.0	+81.3	255.6	+81.7
34	25 6	5	L	68.7	33	74.7	27	275.7	+11.8	267.8	+10.4
35	25 23	5	O	213.3	32	212.3	24.0	79.3	+60.1	90.5	+54.8
36	27 3	4.5	L	77.7	55	79.7	38	287.8	+32.0	272.8	+21.4
37	27 18	5	L	56.7	48	55.7	23	293.2	+18.0	279.7	− 3.1
38	27 43	3*	O	191.3	28.0	186.3	21.5	121.4	+68.0	136.5	+62.9
39	31 44	3*	O	227.3	26.0	224.3	22.0	14.0	+47.1	80.8	+46.1
40	37 11	3*	L	336.7	31.0	343.7	24	351.8	− 8.0	347.3	−16.4
41	38 52	4	L	64.7	16	72.7	14	271.5	− 3.9	264.1	− 0.7
42	44 3	4	F	36.3	19.0	38.3	13.0	297.8	−15.3	293.3	−20.0
43	45 58	2	F,L	300.5	28.0	314.0	23.5	22.9	+ 2.5	17.0	− 7.0
44	47 9	3	O	175.3	47.0	174.3	35.5	224.0	+86.8	174.7	+77.1
45	47 33	4	L	349.7	60	357.7	32	339.7	+18.5	336.3	− 9.8
46	47 54	6	L	10.7	41(:)	21.7	37(:)	326.3	− 0.3	317.2	− 2.7
47	49 2	4	O	147.3	23.0	140.3	22.5	212.0	+53.9	219.5	+49.5
48	49 25	1*	F.P	301.3	32.0	313.3	26.0	21.5	+ 5.8	15.7	− 4.9
49	52 40	4	L	291.7	28	303.7	23	31.5	+ 7.5	25.6	− 2.9
50	12 52 53	3	F	335.3	29.0	347.3	21.0	357.[illegible]	− 9.7	348.2	−19.8

Nr.	Mittlere Wiener Zeit			Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
						A	H	A	H	AR.	Decl.	AR.	Decl.
	h	m	s			°	°	°	°	°	°	°	°
51	12	53	26	5	O.A	190.3	36.0	189.3	26.0	119.7	+75.5	134.0	+66.6
52		53	44	3.4	L	323.7	19	327.7	22	7.5	— 6.1	6.5	—14.0
53		56	0	3	O	155.3	12.0	154.3	9 0	194.1	+48.4	193.6	+45.3
54		56	18	3	F	310.3	37.0	316.3	34.0	14.2	+ 6.0	11.4	+ 1.0
55		56	39	2*	L	108.7	67	113.7	37	301.0	+50.4	259.1	+41.5
56		57	3	2*	O	143.3	52.5	129 3	48.0	272.3	+66.6	265 7	+56.9
57	12	59	23	3	L	337.7	67	339.7	58	346.9	+26.5	348.5	+17.5
58	13	2	48	3	O	139.3	41.5	130.3	37 5	250.1	+60.8	250.0	+52.9
59		2	53	5.6	L	53.7	40	.....	....	299.4	+10.2	....	....
60		13	13	2	F	337.3	46.0	346.3	39.5	356.3	+ 6.2	351.1	— 1.0
61		15	22	5	L.O	155.0	29 0	141.0	27.5	214.4	+62.5	230.8	+53.5
62		16	28	3	O	157.3	19.0	155.3	14.0	201.4	+55 6	200.7	+50.3
63		16	40	3	F	22.3	77.0	25.3	86.0	355.5	+36.0	339.2	+44.5
64		17	22	4	O	215.3	34.0	214.3	26.0	86 9	+60.2	98.8	+55 1
65		18	1	3	L	336.7	24	337.7	16	3.8	—14 8	5.1	—22.8
66		20	54	3	L	27.7	75	53.7	56	334.3	+34.6	313.2	+23.4
67		26	11	6	L	358.7	52	7.7	44	344.9	+10.2	338.4	+ 2.5
68		28	41	3	L	48.7	47	51.7	36(:)	312 7	+14 2	304.8	+ 6.0
69		30	48	4	L F	351.7	50	354.7	43	350.6	+ 8.5	349.1	+ 1.9
70		30	53	5	L	7.7	52	20.5	41	340.4	+10.4	329.8	+ 1.1
71		35	11	3	L	54.7	48	56.7	39	311.4	+17.2	304.9	+10.7
72		40	26	3	O	189.3	30	180.3	25.0	142 5	+70.4	166 5	+66.8
73		42	28	3	L	27.7	45	46.7	44	328.8	+ 6.4	315.9	+10.9
74		43	40	3	L	342.7	45	330.7	40	0.6	+ 4.4	10.5	+ 2.0
75		45	10	3*	O.P	159.3	28.0	145.3	25.0	214.4	+64.3	230.7	+54.4
76		45	31	2	L	83.7	38	100.7	35	290.0	+23.6	277.3	+32.0
77		47	39	4*	O.P	186.3	52.0	175.3	51 0	34.5	+84.4	298 6	+86.3
78		50	18	4	L	60.7	21	87.7	14	295.4	— 2.1	271.1	+ 8.9
79		50	32	3	F	250.3	56.0	241.3	53 0	36 3	+49.2	49 2	+51.8
80		52	4	4	O	196.3	40.0	189.3	32.0	109.3	+75.6	143.9	+70.9
81		52	33	4	L	39.7	41	54.7	38	321.2	+ 5.9	309.9	+ 8.9
82		53	8	2	F	225.3	55.5	.....	....	48.7	+61.5	....	....
83		53	28	6	O	181.0	43.0	168.0	40.0	161.8	+84.7	221.5	+78.1
84		54	29	4	L	293.7	23	295.7	19	48.6	+ 2.5	49 5	— 1.7
85		57	25	3	O	183.3	25.0	174.3	21.0	163.8	+66.7	183.0	+62.4
86		57	30	.	L	282.7	33	293.7	33	50.4	+16.5	43.2	+10.4
87		57	30	5	F	283.3	30.0	286.3	28.0	52.0	+13.8	51.3	+10.5
88		57	58	4	O	197.3	31.0	196.3	26.0	128.0	+68.4	136.0	+64.3
89		58	33	4	L	353.2	67	13.7	70	355.0	+25.3	349.0	+38.4
90	13	58	34	4	F	332.3	73.0	328 3	79.0(:)	1.3	+32 8	359.4	+38.6

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
91	14 3 36	2*	O	225.3	56.0	223.3	56.0	50.3	+61.9	50.5	+62.7
92	7 15	3	[illegible].L	168.5	20.0	165.5	17.0	196.3	+60.3	199.8	+56.7
93	14 9 43	2	F	52.3	53.0	343.3	56.0	324.2	+20.6	4 4	+15.2
94	15 31 28	1	O	9.3	26.0	13.3	17.0	6.6	−15.3	1.5	−23.7

Nr. 5 und 7 langsam.
» 24 und 59 Mitte einer sehr kurzen Bahn.
» 32, 54, 55, 57, 67, 81 sehr schnell.
» 53 nebelartig.
» 56 weiss.
» 68 und 70 schnell.
» 71 sehr schnelles Meteor, das in der Mitte des Laufes am hellsten glänzte.
» 74 schwach zickzack.
» 82 stationäres Meteor.

Die Perseusmeteore schienen alle aus einem nördlicheren Punkte zu kommen als am 11. August.

1869. August 13. Semmering.

Beobachter: Rosner.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	10 25 1	3		258.1	49.9	267 1	46.9	354.4	+41.0	353.7	+34.4
2	36 55	4		240.3	54.8	256.7	49.8	356.6	+52.7	357.9	+41.8
3	43 51	3		270.5	53.2	275.4	37.9	350.7	+35.9	1.8	+23.8
4	10 51 35	3		173.5	39.8	168.3	29.6	158.3	+81.0	155.0	+68.9
5	11 4 50	3		241.6	35.6	248 4	32.2	29.8	+43.8	28.7	+36.9
6	5 31	2		183.3	78.0	188.2	50.9	309.7	+59.6	4.0	+83.8
7	16 13	3		174.3	73.7	204.5	69.6	307.3	+63.7	330.0	+65.0
8	21 21	3*		237.0	40.4	254.7	35.3	30.9	+48.9	25.8	+35 0
9	23 31	3		244.1	48.1	195.0	41.7	17.4	+48.3	65.6	+77.9
10	25 39	4		189.3	59.9	183.3	51.9	333.6	+76.4	340.5	+85.1
11	27 2	3		251.3	36.3	258.1	33.5	28.0	+37.7	27.0	+31.6
12	32 49	....		79 3	39.8	71.3	34.1	260.4	+22.2	261.0	+13.5
13	36 55	1*		238 3	29.5	223.7	23 3	46.6	+42.1	65.3	+47.8
14	38 40	1*		221.3	39.9	219.3	42.4	45.5	+59.4	42.4	+62.0
15	43 16	4		222.3	29.4(:)	222.3	24.9(:)	61.4	+52.8	66.5	+49.7
16	50 41	2		284.5	34.4	301.5	33.5	15.6	+16.2	5.2	+ 6.5
17	11 55 7	4		261.1	52.1	254.8	49 5	13.5	+40.3	18.9	+42.6
18	12 5 45	4		188.8	46.7	182.7	41.2	60 4	+83.8	126.2	+83.2
19	7 10	4		245.4	37.5	237.3	32.1	42.7	+42.3	52.3	+44.4
20	11 57	1		219.8	14 9	220.8	11.9	85.8	+43.7	87.0	+40.7
21	16 40	4		238.3	32.8	202.7	27.6	52.5	+44.3	96.1	+63.1
22	41 50	2		190.2	22.8	194.3	24.9	130.6	+64.2	120.3	+64 7
23	44 50	3		243.6	48.4	244.3	44.7	37.6	+48.8	42.2	+46.4
24	12 49 30	2		242.3	48.7	239.9	15.9	68.7	+34.4	75.8	+31.8
25	13 11 58	4		308.3	21.9	327.1	38.4	12.6	+16.2	5.2	+ 1.0

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
26	13 13 19	3		260.3	41.1	270.6	35.1	45.0	+34.7	44.7	+24.5
27	16 35	3		238.5	62.3	220.5	48.9	24.2	+54.8	52.7	+63.4
28	30 53	3		232.8	55.4	209.3	47.3	41.2	+56.7	64.0	+70.2
29	32 18	3		212.3	60.0	194.3	48.1	29.7	+67.6	67.5	+80.4
30	38 55	4		279.7	41.5	277.3	38.8	41.2	+23.6	43.8	+23.4
31	43 40	3		294.8	47.9	282.3	45.2	28.5	+21.0	37.1	+24.8
32	45 59	3		284.9	27.5	277.3	25 9	49.1	+10.7	55.3	+14.2
33	49 35	2		199.2	34.2	206 3	30.5	115.2	+70.2	109.8	+63.5
34	52 16	3		285.9	46.9	298.3	44.9 (:)	36.0	+24.4	30.5	+17.1
35	52 46	4		207.3	44.9	205.3	38.9	76.3	+71.0	95.9	+69.8
36	13 58 38	4		240.3	55.3	231.7	52.7	46.7	+52.8	53.2	+57.2
37	14 0 25	3*		295.3	36.9	297.7	32.3	39.6	+12.3	40.8	+ 7.6

Nr. 10 gekrümmte Bahn.
» 14 sehr kurze Bahn; Schweif intensiv leuchtend und lange andauernd.
» 21 sehr schnell.
Die Beobachtungen wurden wegen einfallenden Nebels geschlossen.

1869. August 13. Brünn.

Beobachter: Prof. v. Niessel und Landesgerichtsrath Frey.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	A	H	A	H	AR	Decl.	AR.	Decl.
1	11 18 58	4	N	340.2	52.8	340.7	59.5	324.1	+13.7	321.2	+19.9
2	36 59	2.3*	F	328.5	40.2	284.2	50.2	339.1	+12.7	0.6	+28.6
3	38 41	3	N	324.2	53.0	343.2	37.5	337.5	+16.7	329.3	— 2.0
4	11 49 52	4	F	322.2	59.5	301.2	58.5	338.4	+23.0	349.3	+28.0
5	12 4 8	3	N	59.2	42 5	53.7	28.0	281.3	+14.8	276.8	+ 0.7
6	16 40	3	N	336.2	49.5	355.2	66.5	341.0	+10.8	327.6	+25.8
7	31 46	3	N	271.2	35.5	264.2	28.5	33.5	+25.5	43.6	+25.0
8	47 10	3	N	35.2	62.5	77.2	56.5 (:)	315.9	+25.0	292.8	+33.5
9	49 25	4	F	294.2	37.5	300.2	27.5	22.0	+14.4	23.9	+ 3.4
10	52 58	2.3*	F	293.2	31.5	266.2	44.5	27.1	+10.2	33.6	+34 2
11	12 56 43	3.4*	N	26.2	44.5	23.2	20.5	317.0	+ 6.4	312.7	—17.4
12	13 12 26	2	N	67.2	22.5	66.2	15.5	280.6	+ 3.1	277.5	— 3.0
13	15 22	4.*	F	118.2	44.5	108.2	25.5	268.4	+48.6	254.9	+30.6
14	29 47	3.4*	N	9.2	61.5	0.2	70.5	339.1	+20.9	343.6	+29.7
15	13 49 36	2.3	N	25.2	67.0	3.2	61.5	337.8	+27.8	347.0	+20.7

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
16	13 53 6	2.3	F	329.2	53.5	345 2	36.5	8.1	+16.0	1.5	— 3.3
17	14 3 32	4	N	341.2	67.5	17.2	52.5	0.3	+27.7	341.6	+12.7
18	7 4	4	N	38.2	44.5	35.2	26 5	326.3	+ 9.5	321.5	— 8.0
19	13 18	4	N	268.2	38.5	251.2	37.5	58.4	+29.3	69.5	+39.1
20	17 24	5	F	350.2	39.5	344.2	25.5	3.4	— 0.8	10.6	—13.9
21	14 25 10	4	F	288.2	66.5	286.2	45.5	26.3	+37.9	45.3	+24.5

1869. November 12. Wien.

Beobachter: Rosner, Holetschek und Wittek.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	14 13 56	3		262	26	254	5	163.2	+24.2	184 5	+14.4
2	17 56	2		160	26	173	10	309.2	+62.9	277.9	+51.3
3	22 14	2		215	12	231	5 (:)	217.0	+43.6	205.7	+28.9
4	39 4	2		275	41	265	37	149.1	+26.4	158.3	+29.7
5	39 29	1		268	25	265	21	166.3	+19.6	171.4	+18.8
6	43 44	2		255	40	276	32	151.3	+43.1	156.8	+19.6
7	44 51	3		276	41	252	33	149.9	+25.9	171.4	+35.4
8	51 19	3		169	11	158	9	292.7	+51.7	307.7	+46.7
9	14 56 16	3.4		14	16	6	14	81.5	—24.6	89.7	—27.6
10	15 20 14	3		340	55	358	37	90.6	+14.7	103.9	— 4.8
11	29 54	2		238	30	305	21	161.8	+11.2	154 8	— 5.1
12	31 49	2		285	45	263	20	153.6	+23.9	186.5	+19 4
13	34 14	3 4		235	28	242	24	200.9	+43.5	199.2	+36.1
14	36 24	1.2*		236	66	204	63	143.9	+56.4	139 4	+70.2
15	39 14	4		258	71	272	52	135.8	+48.6	155.6	+35.0
16	39 14	2		53 5	15	57.5	9	54.7	—10.9	166.1	—13.8
17	42 39	2*		241	33	233	34	193.2	+42.6	197.8	+48.5
18	44 29	3		258	21	251	22	192.5	+23.4	196.8	+28.7
19	56 39	4		240.5	41	251.5	36	185.7	+47.5	184.7	+37.5
20	15 58 14	1*		83	61	111	57	74.2	+37 8	60.8	+49.1
21	16 3 39	1		294	45	290	16	156.4	+19.6	177.7	— 0.7
22	13 39	2		221.5	45	208.5	35	196.3	+61.6	227.1	+65.2
23	24 44	2		10	31	356	27	109.7	—10.3	122.1	—14.7
24	27 14	2		48	38	41	32	83.7	+ 6.2	85.9	— 1.8
25	16 45 4	4*		13	35	24	26	112.8	— 6.0	101.5	—12.8

Nr.	Mittlere Wiener Zeit			Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
						A	H	A	H	AR	Decl.	AR.	Decl.
	h	m	s			°	°	°	°	°	°	°	°
26	16	50	14	4*		29	34	20	37	101.0	— 3.9	108.9	— 2.9
27		50	20	3.4*		52	22.5	59	22	77.9	— 5.3	72.2	— 2.3
28		54	6	4*		21	55	25	48	113.5	+14.8	109.1	+ 8.6
29		55	4	3.4		35	42	44	38	100.7	+ 5.4	92.7	+ 4.7
30	16	59	12	4		11	29	19	31	116.5	—12.2	109.9	— 8.9
31	17	0	0	2*		68	35	76	32	76.1	+13.0	68.9	+15.0
32		1	9	2*		3	25	352	20	124.6	—16.8	135.6	—21.4
33		33	34	3.4		67	30	50	26	81.9	+ 8.5	92.0	— 3.4
34	17	44	39	1		46	8	37	9	88.8	—20.8	97.8	—24.2

Nr 11 gegen Ende heller werdead.
» 13 und 29 sehr schnell.
» 14 intensiver Schweif.
» 21 intermittirend.
» 23 gekrümmte Bahn.
» 32 langsam.

In der folgenden Nacht, vom 13.—14. November wurde trotz umwölktem Himmel die Rückkehr des Novemebrphänomens erwartet; es wurden auch durch die Wolkendecke einzelne Lichtblitze wahrgenommen. Gegen 16^h trennte sich auf wenige Minuten die Wolkendecke stellenweise, und es wurden sogleich zwischen den Wolkenlücken einige schöne Leoniden gesehen; unmittelbar darauf brach jedoch ein heftiger Orkan los, der die Wolken wieder zusammenballte und ferneres Beobachten unmöglich machte. Gegen Morgen Regen.

1869. November 29. Wien.

Beobachter: Palisa, Schulhof, Holetschek und Sauter.

Nr.	h	m	s	Grösse	Beobachter	A	H	A	H	AR	Decl.	AR.	Decl.
1	8	34	7	3	P	221.5	38.5	261.5	34	109.2	+58.7	87.8	+29.9
2		39	48	1	P	239.5	60	199	47	66.6	+54.5	106.9	+77.1
3		43	9	2	W	170	51	165	44	316.6	+82.9	267.1	+78.8
4		43	55	3	P	298	56	291	57.5	53.3	+26.3	55.2	+30.0
5		54	26	2	H	39	38	45	28	352.6	+ 2.8	343.6	— 3.8
6	8	57	18	2	H.S.P	328	43	317	35	46.0	+ 5.5	57.1	+ 1.6
7	9	1	21	3.4	Sch	300	42	314	28	65.8	+14.6	63.7	— 3.4
8		4	11	3	P	339.5	55	348	47.5	36.8	+14.7	32.9	+ 6.3
9		6	1	♃*	P	343	52	4.5	31.5	35.9	+11.2	21.5	—10.2
10		19	56	2	W	141	35	114	36	128.9	+58.4	310.0	+41.1
11		34	11	1	P	96	31	106	19.5	320.2	+26.4	304.1	+24.9
12	9	41	11	2*	P	337	76	76	37.5	40.8	+35.2	339.6	+19.0
13	10	54	35	1*	P.S.Sch	304.5	39.5	291	28.5	92.8	+10.5	108.5	+ 8.3
14	10	57	54	4	P	40	62	56	64	33.9	+24.8	28.4	+30.4
15	11	4	59	2	Sch	332.5	48	4	53	73.3	+ 9.1	52.6	+1:.3

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
16	11 6 32	3.4	S	57	43.5	91	27	16.5	+14.5	343.5	+20.4
17	8 50	3	W	13	42.5	23.5	36	46.4	+ 1.4	37.2	− 3.2
18	9 2	4	P	115	26	100	28	326.8	+35.5	339.0	+26.9
19	9 41	3	S	48	56	83	31.5	29.6	+21.7	352.8	+18.6
20	12 55	1	W	1	60.5	11	44	56 4	+18.7	49.1	+ 2.7
21	21 32	2	P	300	31.5	293.5	28	107.2	+ 6.1	113.8	+ 6.5
22	25 21	3	Sch	48	37	24	33.5	23.5	+ 5.3	40.2	− 5.4
23	27 26	3	P	6	27	6	24	55.0	−14.6	54.8	−17.6
24	41 28	2	S	244	33	227	26	147.4	+40.6	168.2	+47.4
25	43 34	3	S	258	21	241	20	148.8	+23.4	162.5	+34.0
26	51 21	3	S	230	30	204	27	163.6	+48.0	196.6	+61.7
27	11 57 18	4	P.Sch	301	42	328	39	109.2	+14.1	92.4	+ 1.8
28	12 10 26	3	P	6	24	27	20	65.6	−17.6	44.8	−17.6
29	15 7	3	S	246	24	224	18	163.0	+33.5	187.3	+43.4
30	17 5	3	P	108	51	120	48	14.9	+45.2	6.0	+51.0
31	17 10	2	P.Sch	355	40	346	25	77.0	− 1.7	86.3	−15.7
32	22 55	2	W	79	70	60	67	48.0	+41.0	50.4	+33.8
33	12 29 42	2.3	W	338	60	335	47	87.7	+19.6	93.2	+ 7.7

Nr. 2 röthlich; Dauer 1^s^.
» 6 Dauer 1^s^.
» 13 Anfangs weiss, gegen Ende roth; zersplitterte. Dauer 2^s^.

1859 December 11. Brünn.

Beobachter: Prof. Felgel und Assistent Bartel.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	13 15 26	2	B	61.5	38.5(:)	55.5	22.5(:)	54 4	+13.0	49.8	− 3 0
2	19 47	2	B	127.5	52.5	120.5	40.5	36.6	+57.5	21.9	+48.1
3	21 17	3	B	96.5	72.5	103.5	67.5	74.6	+48.1	66.3	+49.3
4	22 52	4	B	144.5	69.5	148.5	60.5(:)	74 6	+63.5	55.7	+69.0
5	23 47	2	B	119.5	84.5	127.5	77.5	93.8	+51.6	83.8	+55.6
6	27 47	3	B	166.5	50.5	169.5	44.5	29.6	+81.2	344.3	+81.5
7	31 7	3	F	335.0	48.0(:)	330.0	44.0(:)	120.1	+ 9.5	124.6	+ 6.8
8	31 47	1	F	336.0	47.0	331.0	40.0	119 9	+ 8.4	125.4	+ 2.8
9	32 19	3	B	220 5	44.5	224.5	39.5	187.8	+62.3	193.7	+57.3
10	35 22	1*	F	348.0	27.0	337.0	24.0	115.4	−13.0	126.0	−14.0
11	35 39	3	F	357.0	32.0	353.0	15.0	107.1	− 8.8	111.2	−15.5
12	36 15	2	F	54.0	16.0(:)	57 0	13.0(:)	52.6	− 9.3	48.5	−10.2
13	38 27	4	B	273.5	81.5	276.5	71.5	117.9	+48.0	131.2	+43.9

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
14	13 40 2	1*	B	57.5	44.5	64.5	27.5	66.8	+16.3	52.0	+5.7
15	41 58	4	B	85.5	27.5	95.5	23.5	37.7	+17.6	28.1	+21.0
16	42 50	2	B	88.5	39.5	94.5	30.5(:)	45.7	+27.9	34.4	+25.4
17	46 52	3	F	31.0	44.0	34.0	41.0	85.3	+7.0	82.2	+5.2
18	49 57	3	F	347.0	42.0(:)	349.0	39.0(:)	117.7	+1.9	116.6	— 1.2
19	52 38	3	B	120.5	48.5	124.5	36.5	41.2	+51.9	22.5	+48.4
20	55 52	4	B	187.5	26.5	194.5	18.5	272.8	+66.7	263.4	+57.1
21	13 59 2	2	B	125.5	30.5	115.5	19.5	16.5	+45.3	14.3	+31.2
22	14 1 7	3	F	40.0	53.0	54.0	50.0	87.0	+17.7	77.4	+19.5
23	2 25	3	F	150.0	50.0	156.0	44.0	35.1	+70.8	12.5	+72.8
24	18 17	1*	F	73.0	48.0	82.0	47.0	69.8	+25.7	64.4	+29.5
25	26 57	1	F	301.0	57.0	296.0	54.0	149.0	+26.9	153.5	+26.4
26	32 17	1*	F	20.0	76.0	.	.	112.7	+35.9	.	.
27	34 45	2	B	145.5	42.0	152.5	33.0	25.5	+65.1	0.8	+64.0
28	37 12	3	B	250.5	29.0	235.5	24.0	203.3	+33.9	219.4	+40.3
29	40 57	2	F	347.1	55.0	339.0	52.0	128.4	+14.8	133.8	+12.8
30	46 42	3	B	88.5	89.0	.	.	120.7	+49.2	.	.
31	49 17	3	F	11.0	69.0(:)	9.0	63.0(:)	118.4	+28.5	118.2	+22.4
32	54 22	2	F	347.0	70.0(:)	339.0	69.0(:)	129.2	+29.6	132.6	+29.3
33	55 41	3	B	59.5	41.0	66.5	35.0	82.4	+14.3	74.1	+12.7
34	14 57 7	5	B	59.5	79.0	59.5	67.0	112.0	+42.8	100.8	+34.6
35	15 0 39	3	B	41.5	35.0(:)	34.5	29.0	92.7	+1.9	95.9	— 5.9
36	4 12	5	B	153.5	54.0	140.5	25.0	190.2	+73.0	240.4	+51.1
37	5 47	1*	F	333.0	31.0	355.0	27.0	150.1	— 6.2	131.6	—13.7
38	7 27	1*	B	79.5	33.0	89.5	17.0	67.5	+18.3	49.5	+12.4
39	8 57	1	B	149.5	20.0	160.5	8.0	358.7	+52.0	336.1	+45.6
40	10 17	3	F	339.0	33.0(:)	335.0	31.0(:)	145.7	— 5.7	149.5	— 6.7
41	14 12	1	B	129.5	21.0	136.5	11.0	22.4	+41.4	7.6	+37.6
42	16 32	1	F	31.0	30.0	31.0	21.0	103.1	— 6.1	99.9	—14.6
43	18 49	3*	B	102.5	69.0	103.5	60.0	98.1	+49.3	84.9	+47.1
44	24 7	1	F	49.0	26.0	47.0	22.0	88.7	— 3.1	88.5	— 7.5
45	35 17	2	F	49.0	45.0	48.0	41.0	101.1	+13.5	99.7	+9.7
46	48 31	3	B	14.5	27.0	3.5	13.0	124.3	—12.6	133.7	—27.7
47	56 23	2	B	92.5	37.0	98.5	25.0	74.4	+28.6	60.8	+24.0
48	57 57	3	B	56.5	41.0(:)	53.5	24.0	99.8	+13.1	92.6	— 2.8
49	58 57	5	F	13.0	61.0	27.0	54.0	133.6	+20.7	124.2	+15.6
50	15 59 48	3	B	81.5	38.0	.	.	82.9	+22.9	.	.
51	16 1 57	3	F	341.0	36.0	333.0	33.0	156.2	— 3.2	163.4	— 4.4
52	16 6 52	1*	F	359.0	44.0	351.0	39.0	143.1	+ 3.2	149.3	— 1.4

Nr	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
53	16 13 57	3	F	27.0	28.0	25.0	22.0	120.1	− 9.1	120.0	− 15.4
54	16 18 37	1*	F	68.0	48.0	84.0	43.0	102.6	+23.5	89.9	+27.8

Nr. 10. langsam.
» 14 grünes Meteor mit lang andauerndem Schweife.
» 24 Schweif glänzend.
» 26 beinahe stationär; eingestellt Mitte der Bahn. Ebenso Nr. 30 und 50.
» 37 intensiver Schweif.
» 37 glänzender, grüner Schweif.

1870. Januar 25. Wien.

Beobachter: Schulhof, A. v. Littrow, Holetschek, Sauter.

Nr	Mittlere Wiener Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	9 31 11	2	L	171	55.5	181	48	54.1	+80.0	195.1	+89.2
2	9 36 30	3.4	Sch	80	40	97	42.5	34.1	+23.0	26.7	+34.3
3	10 22 50	3.4	Sch	109	45.5	93	44.5	35.4	+43.1	42.3	+33.2
4	32 52	3.4	Sch	136	44.5	.	.	22.9	+59.8	.	.
5	33 45	2	S	331	51	347	39	121.6	+12.3	113.5	− 2.0
6	47 40	2	L	145	46.5	154	35.5 (!)	26.0	+66.4	353.0	+67.0
7	48 48	3	S	96	53	106	36.5	56.2	+39.6	33.9	+36.2
8	53 36	1.2	W	195	69.5	79	51.5	122.1	+67.5	63.3	+30.3
9	10 57 4	2	W	63	59.5	122	49.5	77.9	+29.2	43.7	+52.7
10	11 19 45	3	Sch	224	41.5	238	29.5	200.4	+58.5	206.0	+42.0
11	45 20	2	Sch H	0.5	46	11.5	35	121.0	+ 4.2	111.9	− 6.1
12	11 49 15	3.4	Sch	13	44 (:)	31	50 (:)	112.9	+ 2.9	102.5	+11.7
13	12 0 10	4	L	97.5	31.5	97	26 (!)	52.5	+27.7	48.3	+23.6
14	12 4 5	5.6	L	263	73	272	59.5	151.4	+47.5	166.7	+39.0

Nr. 4 Mitte einer sehr kurzen Bahn.
» 13 schlangenförmige Bahn.

Himmel vom Anfange an theilweise bewölkt; die Bewölkung nahm nach und nach so zu, dass um 12^h 30^m bei vollständig bedecktem Himmel die Beobachtungen geschlossen wurden.

1870. Januar 26. Wien.

Beobachter: Schulhof und Sauter.

Nr	Mittlere Wiener Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	11 33 48	3	S	27	26.5	48	19.5	93.9	−11.4	73.1	− 9.8
2	35 18	3	S.Sch	19	20.5	36	17.5	101.0	−19.2	84.0	−16.8
3	41 18	3	Sch	138	24.5	.	.	10.8	+49.4	.	.
4	11 44 8	2	W	78	37.5	83	27.5	66.2	+20.1	55.8	+15.8
5	12 4 34	1.2	Sch.S	328.5	40	12	34	150.8	+ 2.5	117.2	− 7.1

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
6	12 10 42	2	Sch	31	48.5	46	47.5	108.4	+10.3	98.7	+13.6
7	16 58	3	W	106	51.5	117	46.5	73.7	+44.3	62.5	+48 5
8	27 18	2.3	S	270	48.5	244	29.5	185.9	+34.0	219.7	+38.4
9	35 58	2.3	S	210	37.5	185	28.5	240.0	+65.7	302.0	+70.0
10	12 39 58	3	W	288	19.5	285	18 5	199.9	— 3.1	202 7	+ 4 1

Nr. 3 fast stationäres Meteor.

Von $9\frac{1}{2}^h$ bis $10\frac{1}{2}^h$ keine einzige Sternschnuppe gesehen. Hierauf wurden der intensiven Kälte wegen (das Thermometer zeigte —9°.4 R.) die Beobachtungen bis 11^h 30^m unterbrochen.

1870. Februar 23. Wien

Beobachter: Palisa, Schulhof und Sauter.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	8 52 14	3	Sch	106	37	.	.	33.8	+36.5	.	.
2	8 56 19	3	S	137	49	120	45	35.6	+62.0	36.4	+49.8
3	9 14 12	3	P	17	33	13	31	97.7	— 7.4	100.8	— 9.9
4	9 35 4	4	P.Sch	4	27 (!)	2	14 (!)	113.6	—14.7	115.1	—27.8
5	10 43 27	4	P	359	50	339	45	134.4	+ 8.2	149.2	+ 5.0
6	11 21 39	5	P	48	45	18	38	111.5	+12.3	129.9	— 2.3
7	30 14	2	P	100	69	153	47	114.6	+47.5	62.5	+71.9
8	11 58 19	2	P	122	41	134	27	75.4	+49.1	149.3	+48.7
9	12 4 24	2	Sch	124	39	148	32	73.0	+49.6	311.3	+72 7
10	12 7 25	3	P	147	46	150	40	72.2	+67.7	55.5	+67.1

Nr. 1 röthliches stationäres Meteor.

» 4 kleine Feuerkugel; anfangs röthlich, gegen Ende grünlich. Unmittelbar darauf erschien ein zweites sehr ähnliches, nur etwas kleineres Meteor.

» 10 schnell.

Die Beobachtungen wurden um 6^h 50^m begonnen und um 10^h 50^m geschlossen.

1870. März 1 Wien.

Beobachter: Palisa und Sauter.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	9 27 0	3.4	S	286.5	36	305.5	34	175.2	+16.5	163.8	+ 5.5
2	38 7	3	S	250.5	35	257.5	30	200.8	+37.6	200.9	+29.8
3	50 57	2	S	237.5	28	256.5	21	220.2	+41.8	212.2	+24.4
4	54 31	4	P	359 5	53 (:)	338.5	37 (:)	128.3	+11.2	145.0	— 2.6
5	9 57 10	2	P	82.5	19 (!)	76.5	16 (!)	57.0	+ 9.2	59.2	+ 3.1

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
6	10 12 40	3.4	S	250.5	46	234.5	40	197.4	+43.7	223.7	+50.9
7	17 22	3	P	89.5	43	94.5	34	75.9	+30.3	65.1	+27.4
8	10 36 10	4	S	318.5	41	328.5	45	168.6	+ 6.4	160.3	+ 7.1
9	11 9 19	2	P	110.5	56	107.5	51	94 5	+48.5	88.8	+44.9
10	13 19	5	P	125	48	124	50	78 6	+54.1	82.1	+54.2
11	11 22 15	3	S	200.5	76 (:)	197.5	59	162.0	+60.3	186.9	+75.1
12	12 4 0	3	S	276.5	35	287.5	30	221.4	+21.4	217.8	+11.4
13	47 40	4	P	44.5	58	60.5	54	147.7	+22.4	137.2	+24.2
14	12 53 18	4	P	103.5	31 (:)	107.5	22	95.9	+31.2	85.4	+27.7
15	13 3 6	3	P	237.5	57	5.5	39	228.5	+55.1	170.9	— 2.6

Nr. 5 langsam; Dauer 2^s.
» 10 gekrümmte Bahn, ging durch Az. = 125.°5 H = 49°.
Beobachtungen um 13^h 20^m geschlossen.

1870. März 2. Wien.

Beobachter: Palisa, Schulhof und Sauter.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR	Ende Decl.
1	8 36 41	3	P	17	41	0	32	96.9	+ 0.4	109.7	— 9.8
2	48 13	2	P	103	55	95	48	61.2	+44 2	56.5	+36.4
3	8 49 23	2.3	S	226	34.5	214	25.5	207.5	+53.5	230.9	+55.0
4	9 31 33	1*	S	21	45.5	181	45.5	103.7	+ 5.4	283.3	+87.2
5	43 32	2 3	Sch	1	40.5	33	23.5	120.6	— 1.3	90.7	—12.4
6	9 48 23	4	S	67	33	84	25	70.7	+10.8	53 9	+14.6
7	10 14 18	2.3	S	272	29	256	23	196.6	+19.9	212.0	+26.1
8	23 3	4	P	147	24 5	140	23.5	15.9	+54.9	22.7	+49.9
9	27 38	3	P.S	231.5	44.5	238.5	40	213 7	+54.9	216.2	+48.3
10	31 33	2.3	S	296	43.5	281	39.5	181.5	+17.5	193.3	+22.0
11	10 37 53	♃	P.S	131.5	35 (:)	109	22.5 (!)	42.8	+55.4	50.9	+29.0
12	11 3 0	3	Sch	104	50	87	30	88.7	+42.5	79.2	+20.0
13	4 23	3.4	S	216	10	228	16	276.3	+41.3	259.3	+39.4
14	14 15	3.4	S	80	42	61	29	94 7	+24 4	98.0	+ 4.5
15	27 18	2	S	291	48.5	281	42.5	194.8	+23.6	204.8	+24.1
16	42 3	3.4	S	279	37.5	274	27.5	213.6	+21.7	224.3	+17.6
17	11 44 48	3	Sch	228	31.5	217	21.5	253.6	+50.3	275.6	+50.2
18	12 0 48	3	Sch	230	23	232	22	265.1	+43.3	264.2	+41.5
19	12 35	1.2*	P.Sch	305	54.5 (:)	319	31.5	196 6	+20.2	197.8	— 2.2
20	12 58	3	P	331	51.5	347	64.5	181.8	+12.7	169.9	+23.1

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
21	12 16 2	3	P	348	45	261	48	173.0	+ 3.8	222.2	+38.6
22	24 28	5	P	247	34	240	39	246.8	+39.3	245.8	+46.8
23	38 58	2.3	P	213	42	203	33	263.0	+66.2	293.4	+67.1
24	12 56 5	3	P	42	51	218	56	148.6	+15.6	231.4	+65.8
25	13 0 33	1	Sch	2	12.5	4	4.5	173.3	—29.3	170.6	—37.2
26	7 13	3	P	247	60	242	51 (:)	224.2	+50.9	238 8	+50.3
27	14 43	2	P	121	56	116	43	123.4	+54.1	106.3	+46.2
28	19 13	2	Sch.S	232	41	239	24.5	261.7	+53.0	275.6	+38.4
29	30 3	1.2	P	321	49	339	41	208.0	+12.9	198.7	+ 1.2
30	13 37 41	3	P	218	48	214	34	261.0	+64.9	291.6	+61.1
31	13 43 31	2	P	230	16	217	8	297.0	+38.2	316.2	+39.1
32	13 54 41	2	Sch	138	34	149	30	90.3	+55.8	72.8	+60.2
33	14 14 23	4	S	88	55	96	47	148.5	+36.7	136.7	+36.4
34	15 43	3.4	S	32	57	52	47	176.7	+18 6	160.5	+15.4
35	50 3	♀	P	312	39.5	283	21	238.3	+ 7.4	269.5	+ 7.3
36	51 31	4	P	308	43	315	40	239.6	+12.1	236.5	+ 6.7
37	14 58 23	5	P	330	59	333	45	221.0	+20.0	224.0	+ 6.2
38	15 6 53	3	P	117	35.5	129	23.5	126.0	+42.8	104 2	+43.0

Nr. 4 weiss, Dauer 3^s.
» 5 an Helligkeit allmählich abnehmend.
» 11 kleine, an Helligkeit nach und nach zunehmende Feuerkugel.
» 12 Dauer über 1^s.
» 19 Schweif roth.
» 25 weiss, Dauer 2^s.
» 31 Dauer 1^s.
» 35 kleine Feuerkugel, Dauer 2^s.

1870. März 3. Wien.

Beobachter: Assistent Prey, Holetschek und Sauter.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	9 27 19	3.4	S	224.5	27	207.5	21	228.6	+49.6	254.6	+55.0
2	9 54 1	3	H	17	19	34	18	112.6	—21.1	96.0	—17.1
3	10 16 45	3.4	S	26.5	53 (:)	52.5	46 (:)	119.7	+13.7	100.9	+14.7
4	36 54	3	S	123.5	64	170.5	47	99.7	+56.2	43.6	+83.5
5	10 43 2	3	Pr.	116	29.5	120	28	55.4	+38.4	51.0	+40.1
6	11 1 15	1	Pr.	84.5	9 (:)	83	0	66.8	+ 3.0	62.0	— 4.7
7	11 16 14	2.3	S	171.5	49	163.5	34	71.7	+84.4	17.5	+71.2
8	12 18 44	1	H	318.5	28 (!)	330.5	22 (!)	187.1	— 5.2	179.3	—14.9

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.

Nr. 2 langsam.
» 8 schnell, weiss.
Himmel meist etwa $^{3}/_{4}$ bedeckt. Schluss der Beobachtungen um 13^{h} 30^{m}.

1870. April 2. Troppau.

Beobachter: Palisa.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
1	9 16 5	2		167.5	60.5	162.5	42.5	122.3	+77.3	35.6	+76 0
2	52 0	5		353.5	39	1.5	34	165.5	— 0.9	159.2	— 6.1
3	9 57 23	2		343.5	79	350.5	46	166.0	+39.3	168.6	+ 6.3
4	10 21 25	2.3		289.5	50	297.5	36.5	210.6	+26.5	214.2	+13.2
5	26 15	2		14.5	59	86.5	78	161.2	+19.7	151.1	+47.7
6	10 26 18	2		265.5	8	263.5	4	257.4	+ 9.0	261.6	+ 7.3

Nr. 1 roth.
Um 10^{h} 32^{m} die Beobachtungen wegen Umwölkung des Himmels geschlossen.

1870. April 5. Troppau.

Beobachter: Palisa.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	8 53 15	3.4		339.5	65.0	326.5	60.0	158.2	+26.0	166.1	+23.2
2	9 10 10	3		251.0	22.0	257.5	19.0	242.4	+28.7	239.6	+22.5
3	35 40	4		7.5	22.5	9.5	19.5	152.1	—17.2	149.9	—20 0
4	41 25	2		34.5	67 0(!)	46.0	61.5(!)	146.0	+29.8	138.1	+27.4
5	45 13	4		10 0	52.5	24.5	50.0	155.5	+12.7	146.0	+12.0
6	9 50 54	4		261.5	34.0	245.5	32.5	235.1	+30.5	247.3	+39.6
7	10 6 43	1		263.0	43.0	243.5	35.5	230.1	+35.5	249.6	+42.7
8	9 0	2		182.5	83.0	133.5	66.5	168.1	+56.9	130.6	+61.4
9	18 40	2		285.5	18.0	.	.	237.0	+ 4.3	.	.
10	18 44	1.2		293.0	24 5	311.5	22.5	227.4	+ 5.0	213.8	— 5.8
11	24 0	4		318.5	62.0	322.5	79.0	191.9	+26.7	180.3	+40.8
12	26 35	4		93.5	36.0	93.5	30.0	105.1	+28 8	100.4	+34.7
13	35 40	1*		349.5	71.0	348.5	75.5	178.3	+31.2	177.9	+35.6
14	40 30	4		224.5	54.5	201.5	46.0	238.8	+62.9	273.5	+75.2
15	10 59 33	4		58.5	35.0	69.5	31.5	135.4	+ 9.3	125.6	+12.0
16	11 13 50	2		36.5	47.0	52.5	39.5	159.6	+12.0	145.9	+10.4
17	21 25	2		53.5	60.0	53.5	59.0	158.7	+28.0	158.1	+27.2
18	11 22 25	4		194.5	78.0	194.5	81.5	192.5	+61.4	190.1	+58.1

Nr. 3 gekrümmte Bahn.
» 4 Dauer 1^s.
» 9 sehr kurze Bahn; fast stationär. Bahnrichtung gegen Az. = 291°, Höhe = 22°, d. h. gegen AR. = 230°, Decl. = + 4° hin.
» 10 Dauer $1\frac{1}{2}^s$.
» 13 Dauer 1^s. Schweif kurz und schwach.

Der grösste Theil der Meteore schien aus einem Radianten zwischen dem Haar der Berenice und Denebola zu kommen.

1870. April 19. Wien.

Beobachter: Schulhof und A. v. Littrow.

Nr.	Mittlere Wiener Zeit			Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
						A	H	A	H	AR.	Decl.	AR.	Decl.
	h	m	s			°	°	°	°	°	°	°	°
1	10	4	26	1	Sch	247	22	.	.	270.1	+31.4	.	.
2		37	16	4	L	287.8	43.3	282.8	41	235.1	+21.3	241.3	+23.7
3		38	41	1	Sch	275	26	281	22	256.1	+16.0	254.6	+ 9.3
4		39	23	2	L Sch	263.4	35.4	253	27.5	256.1	+29.6	270.0	+31.2
5		43	53	5	L	304.8	52.5	295.2	50.8	221.3	+20.9	227.2	+23.6
6		43	57	2	Sch	240	76	258	73	209.4	+53.5	214.6	+48 9
7		52	15	1.2	L	135.8	36.2	132.2	21.8(!)	96.9	+55.7	83.3	+43.9
8	10	52	48	3	Sch	217	20	210	17	311.4	+49.1	322.4	+50.4
9	11	2	0	2	L	195.8	53.8	168.8	48.8	247.5	+78.6	112.2	+82.7
10		3	45	1	L	179.8	52.8	181.2	43.8	192.1	+85.5	2.6	+84.9
11		5	51	1	L.Sch	171.2	32.6	155.2	25.9(:)	40.9	+73.1	61.7	+59.6
12		10	25	2	L.Sch	153.8	31.8	148.8	25.8	75.1	+64.3	74.0	+56.9
13		24	53	1*	Sch	281 8	55.8	280.8	29.8	239.9	+32.7	261.0	+15.3
14		30	48	1	Sch	257	49	.	.	258.9	+41.4	.	.
15		31	23	4	L	12.8	44.2	16.8	36.8	191.5	+ 3.1	187.2	— 3.7
16		34	0	1	L	288.3	33.8	290.8	25.3	255 7	+13.8	259.4	+ 6.0
17		37	23	1	Sch	246	39	230	51	277.7	+42.9	268.2	+58.1
18		43	6	1	L	234.8	36.8	227.8	35.8	288.8	+49.0	295.4	+53.0
19		44	3	1	Sch	231	38	208	15	290.0	+52.2	339.3	+49.6
20		47	53	3	L	23.8	21.2	28.8	13.8	181.6	--17.4	174.4	—22.8
21		48	15	2	Sch	203	32	186	24	329.6	+66.3	11.7	+65.4
22	11	59	48	3	Sch	192	36	185	24	347.5	+74.9	16.7	+65.5

Nr. 1 fast stationäres Meteor.
» 9 sehr schnell.
» 13 Schweif zerstäubt.
» 14 Stationäres Meteor. Dauer 2^s.

Nicht ganz heiter. Die Beobachtungen wurden um $9^h\ 20^m$ begonnen und um $12^h\ 15^m$ geschlossen. Vertreten war ein Radiant in der Nähe von Vega und noch ein zweiter nicht gar fern von diesem in der Leier.

1870. April 19. Troppau.

Beobachter: Palisa und Merklas.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Dec	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
1	9 1 10	2	P	289.5	47.5	279.5	42.5	208.9	+24.7	218.4	+26.0
2	23 29	4	P	187.5	59.0	203.5	63.5	192.5	+79.9	204.0	+71.6
3	25 49	4	P	204.5	43.5	208.5	55.5	272.9	+72.1	232.2	+72.1
4	27 31	4*	M	183.5	37.5	170.5	32.0	338.8	+77.3	15.7	+70.7
5	31 50	4*	P	245.5	59.0	232.0	47.0	223.0	+53.4	246.6	+56.1
6	36 46	2	P	227.5	32.0	.	.	272.1	+50.7	.	.
7	40 16	3*	P	278.5	63.5	247.5	71.5	209.3	+39.9	203.6	+53.5
8	41 41	3	M	230.0	55.5	225.5	44.0	234.4	+60.0	257.6	+58.9
9	9 43 1	4	P	245.5	59.0	247.5	58.5	224.8	+52.4	225.6	+51.3
10	10 0 51	1	P	239.5	51.5	224.5	46.0	243.4	+53.3	259.5	+60.4
11	5 31	2	M	98.5	53.5	102.5	45.5	128.0	+42.2	117.2	+40.0
12	8 2	4	M	184.5	42.5	178.5	39.5	339.0	+82.0	7.1	+79.5
13	8 3	3	P	245.5	55.5	231.5	50.5	237.0	+51.4	250.0	+57.7
14	11 11	1	P	326.5	53.5 (:)	338.5	61.5 (:)	202.1	+17.2	192.9	+22.7
15	12 40	2,3*	M	215.0	40.5	205.5	41.0	280.4	+64.1	290.0	+70.5
16	20 49	3	M	207.5	42.0	206.0	39.5	286.7	+69.5	294.2	+68.9
17	21 1	3	M	217.5	42.5	212.0	39.5	274.2	+63.4	287.2	+65.2
18	46 4	2*	P	246.5	59.5	248.5	82.5	240.1	+52.1	202.0	+52.1
19	46 19	2*	P	331.5	47.5	358.5	57.5 (:)	210.1	+10.4	191.7	+17.4
20	10 53 44	1*	M	219.5	41.5	214.5	43.5	284.5	+61.5	284.8	+65.7
21	11 1 16	5	M	235.0	44.5	223.5	42.0	271.0	+53.2	282.3	+59.2
22	3 40	5	M	199.0	52.0	189.5	48.5	268.0	+78.0	295.9	+83.7
23	6 56	2	P	284.5	13.5	294.5	19.5	160.0	+ 9.1	255.0	+ 0.2
24	8 21	3	P	261.5	54.5 (:)	271.5	40.5 (:)	247.2	+39.7	256.6	+29.[illegible]
25	20 36	2*	P	303.5	54.5	342.5	52.5	231.6	+24.6	210.3	+13.5
26	23 40	3	P	327.5	54.5	333.5	51.0	219.4	+17.9	216.9	+13.4
27	25 31	5	M	191.0	43.5	185.5	41.5	326.8	+80.2	353.6	+80.7
28	30 26	2	P	254.0	21.5	.	.	289.4	+26.4	.	.
29	33 21	5	P	225.0	40.0	220.5	37.5	292.8	+57.2	300.4	+58.7
30	36 26	3	M	286.5	17.5	286.5	14.5	269.7	+ 3.2	271.6	+ 0.8
31	38 19	1	P	8.5	36.5	26.5	29.5	197.0	— 3.2	180.7	— 7.1
32	41 31	3	P	198.5	49.5	209.5	64.5	289.9	+78.1	240.3	+68.7
33	11 45 46	2*	P	283.5	48.5	273.5	44.5	252.6	+28.3	251.5	+30.6

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.

Nr. 1 roth; Dauer 1ˢ
» 6 stationäres Meteor.
» 9 und 11 langsam.
» 10 schnelles, gelbes Meteor.
» 17 gleichzeitig noch ein drittes Meteor vierter Grösse im Westen; alle drei convergirten gegen einen Punkt: Az. = 208°H = 39° (α = 293.°0 δ = + 67.°5.)
» 18 und 19 hatten genau denselben Charakter. Wohl ein und derselben Radiation angehörig.
» 20 schnelles, gelbes Meteor.
» 22 schnell.
» 25 sehr schönes, gelbes Meteor; kurz vorher eine andere Sternschnuppe im Zenith.
» 28 stationäres Meteor.
» 31 weiss; Nr. 32 Dauer 1ˢ
» 33 rothes Meteor mit rasch vergänglichem Schweife Dauer 1½ˢ.

1870. April 19. Krakau.

Director Karlinski.

Die Beobachtungen in Krakau sind nicht am Meteoroskope angestellt, sondern unmittelbar in Sternkarten eingezeichnet.

Nr.	Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
	h m			°	°	°	°	°	°	°	°
1	9 4.0	2		.	.	.	.	86	+ 7	89	— 1
2	10 10.0	2		.	.	.	.	161	+ 7	142	+ 1
3	44.0	2		.	.	.	.	147	+17	124	+21
4	44.3	1.2		.	.	.	.	149	+12	137	+ 4
5	11 7.0	2.3		.	.	.	.	141	+34	150	+26
6	19.0	1		.	.	.	.	166	+16	153	+ 1
7	11 36.0	2		.	.	.	.	168	+ 9	156	— 2

Nr. 4 krumme Bahn.

1870. April 20. Wien.

Beobachter: Prof. v. Oppolzer, Schulhof, A. v. Littrow und Sauter.

Nr.	Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	9 13 10	3	O	101.3	56.0 (:)	86.9	48.3	117.8	+43.8	115.5	+32.2
2	14 30	2	O.L	167.0	24.8	160.5	17.8	15.7	+64.5	21.4	+55.7
3	20 19	1	Sa	253.0	56.0	359.0	58.0	220.0	+46.7	169.4	+16.2
4	22 8	4	L	327.8	46.5	327.8	52.0	191.0	+ 8.7	188.9	+13.8
5	9 23 8	2	L	322.8	33.5	302.8	33.5	199.0	— 1.9	214.4	+ 6 3

Nr.	Mittlere Wiener Zeit			Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
						A	H	A	H	AR.	Decl.	AR.	Decl.
	h	m	s			°	°	°	°	°	°	°	°
6	9	25	18	3	L	258.8	30.0	263.8	33.5	246.1	+29.0	240.0	+28.1
7		26	48	3	O	179.8	44.5	177.3	40.5	352.6	+86.3	5.1	+82.0
8		26	52	3	L	273.3	39.0	277.8	41.5	230.1	+26.1	225.5	+25.2
9		31	46	2	L	257.8	65.0	296.8	69.5 (!)	209.4	+47.4	194.6	+36.4
10		33	0	5	Sa	52.0	58.0	61.0	45.0	144.7	+24.5	131.6	+17.4
11		34	12	1	L	247.8	17.5	.	.	266.7	+27.7	.	.
12		34	36	2.3	Sa	69.8	41.0	92.8	26.0	124.1	+18.4	98.5	+20.8
13		55	7	6	L	239.8	55.5	229.8	54.5	232.9	+53.5	236.8	+59.0
14		57	5	1.2	Sch	292.2	67.0	31.2	68.0	204.5	+36.0	165.2	+28.5
15	9	57	5	3	L	302.8	55.0	326.8	57.5	209.9	+23.8	196.2	+19.3
16	10	3	8	4	L	255.3	52.0	268.8	55.5	235.0	+43.8	225.8	+38.6
17		6	38	5	L	229.8	37.5	221.3	40.5	268.1	+52.7	269.6	+59.8
18		8	12	2.3	Sa	77.8	25.0	66.8	14.0	116.4	+10.8	117.3	— 4.2
19		9	34	3	Sa	169.8	42.0	140.8	25.0	53.9	+80.5	68.2	+51.6
20		11	12	♀ *	L.O.Sch	212.4	46.5	162.9	42.5	264.1	+68.5	73.1	+76.1
21		11	39	4	O	171.8	28.5	160.8	23.5	22.5	+69.4	40.3	+60.9
22		14	2	2.3	Sa	162.8	54.0	143.8	45.0	127.0	+77.8	98.5	+65.2
23		33	48	4	O	217.8	49.5	202.8	48.0 (:)	259.9	+65.3	269.4	+74.8
24		37	5	3.4	L	265.8	24.5	269.8	36.0	263.9	+20.7	252.3	+26.1
25		40	35	2.3	Sch.L	199.0	58.0 (!)	165.8	52.5	230.7	+75.0	129.6	+80.1
26		48	26	3.4	O	244.8	48.5	241.8	44.5	255.2	+48.2	261.9	+48.4
27		50	59	5	L	264.8	24.5	268.8	22.5	268.2	+21.3	266.8	+17.3
28		52	28	1*	L.O.Sa.Sch	270.4	22.4 (!)	252.7	16.8	266.5	+16.1	283.2	+24.0
29	10	56	49	3	O	282.8	32.0	275.8	29.5	252.2	+15.6	258.6	+17.9
30	11	1	12	3	L	270.2	27.0	265.2	24.0	265.3	+19.7	270.9	+20.8
31		3	56	1.2*	O.L	152.0	44.7	136.0	32.2	105.4	+70.4	95.2	+53.4
32		4	12	3.4	Sch	184.0	36.0	164.0	32.0	359.7	+77.4	57.4	+69.8
33		7	3	3.4	L	284.8	34.0	291.8	37.0	252.0	+16.0	245.5	+14.6
34		7	35	2	Sch	175.4	23.0	161.0	9.0	26.5	+64.5	44.2	+47.7
35		12	57	2	Sch	161.2	31.0	158.[illegible]	8.0	63.7	+67.7	48.8	+45.8
36		19	28	3	L.O.Sa.Sch	232.9	45.6	216.8	35.0	272.3	+54.4	300.9	+59.6
37		21	53	2	O	230.8	10.0	226.8	8.5	313.9	+33.0	319.2	+34.1
38		24	30	2	L	159.8	45.5	157.8	42.5	106.4	+75.9	97.9	+73.4
39		26	22	2.3	Sa	145.0	53.0	133.0	40.0	135.9	+67.5	114.4	+55.9
40		28	22	2.3	Sa	306.0	63.0	219.0	48.0	225.7	+29.1	276.6	+64.3
41		41	50	♃	O	252.8	15.5	250.8	14.0	296.2	+23.0	298.8	+23.2
42		45	37	1*	L	259.8	25.5	260.8	14.5	284.4	+25.3	292.1	+16.9
43		47	47	1.2*	Sa.	265.2	67.0	242.0	51.0	239.3	+45.2	267.7	+50.9
44		49	15	3	O	264.8	31.0	263.3	27.0	277.7	+25.9	281.8	+24.1
45	11	51	28	1	L	328.8	12.5	319.8	11.5	239.7	—23.2	248.9	—20.7

Nr.	Mittlere Wiener Zeit			Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
						A	H	A	H	AR.	Decl.	AR.	Decl.
	h	m	s			°	°	°	°	°	°	°	°
46	11	52	22	2	O	183.7	14.0	.	.	20.6	+55.6	.	.
47		52	59	4	L	254.8	59.5	252.8	67.0	253.0	+47.0	242.4	+49.8
48	11	54	57	2.3	Sa	333.0	36.0	353.0	27.0	229.2	— 2.5	214.1	—14.5
49	12	0	50	6	O	146.2	15.0	149.2	9.0	80.6	+46.8	72.6	+43.1
50		1	20	1*	Sch.L	261.8	20.5	258.5	15.2 (:)	291.0	+20.5	297.2	+19.0
51		2	9	1*	O	306.2	43.0	319.2	35.0 (.)	246.7	+12.8	241.8	+ 0.7
52		7	56	2	Sch	74.0	18.0 (:)	93.0	15.0 (:)	144.5	+ 3.2	128.8	+13.2
53		9	27	2.3	Sa	69.0	46.0	61.0	35.0	166.9	+21.7	164.6	+ 9.4
54		9	52	3	L	34.8	52.5	37.8	43.5	190.2	+15.0	184.6	+ 7.6
55		11	45	2	L	334.8	35.5	340.8	28.5	232.1	— 3.3	229.0	—11.4
56		13	6	2	L	347.8	64.5 (:)	17.8	52.5 (:)	217.8	+23.1	201.1	+11.9
57		15	16	1*	L	111.8	48.5	104.8	24.5	149.8	+46.3	129.3	+27.7
58		15	23	4	L	165.8	40.5(!)	171.8	33.5(!)	91.2	+77.3	58.3	+74.1
59		17	54	5	L	233.8	85.0	156.8	71.5	219.7	+51.0	196.5	+64.4
60		19	23	4	Sa	359.0	22.0	352.0	14.0	214.7	—19.8	222.4	—27.4
61		21	27	1*	L	128.3	43.5	134.8	33.5	136.4	+54.4	117.5	+53.4
62		22	42	3.4	Sa	264.0	44.0	256.0	42.0	274.9	+34.0	281.1	+38.2
63		24	23	2.3	Sch	223.2	34.0	214.2	26.0	312.7	+55.0	352.3	+55.3
64		27	40	2	L	341.8	33.5	346.8	20.5	231.1	— 6.7	229.0	—20.3
65		31	7	2.3	L	341.8	61.5	333.8	53.5	225.9	+20.7	232.3	+14.1
66		31	33	1	Sa	222.0	56.0	201.0	49.0	273.8	+63.5	295.6	+76.1
67		31	42	2	L	358.8	63.5	15.8	61.5	217.4	+21.7	208.8	+20.5
68		33	40	3	Sch	292.2	52.0	299.2	34.0	256.5	+25.6	264.4	+ 8.5
69		34	32	2.3	Sa	21.0	33.0	32.0	22.0	199.8	— 6.6	187.1	—14.1
70		37	12	1	Sch	108.2	27.0	103.8	11.0	134.5	+31.6	125.3	+17.4
71		37	17	2	L	14.8	42.5	25.8	34.0	207.3	+ 1.6	197.3	— 4.6
72		41	11	5	L	320.8	39.5	326.8	34.5	248.3	+ 4.3	246.1	— 2.1
73		46	15	3	Sch	250.2	37.0	242.2	29.0	295.8	+39.0	309.0	+39.4
74		48	34	4	O	20.8	23.5	25.8	15.5	201.1	—15.9	194.0	—22.3
75		59	23	2	L	284.8	38.5	282.8	25.5	277.1	+19.3	287.4	+10.8
76	12	59	59	2	Sch	195.2	39.0	168.2	27.0	348.2	+75.7	71.4	+67.0
77	13	0	20	4	L	126.8	37.0	137.8	33.5	137.9	+50.1	124.5	+55.4
78		2	8	4	L	5.8	22.5	10.8	18.5	218.7	—19.1	213.2	—22.6
79		3	12	3	O	289.8	61.5	292.8	46.5	257.1	+33.2	267.6	+31.3
80		3	52	3	O	237.8	48.0	.	.	292.7	+52.3	.	.
81		3	52	3	L.Sa	27.9	23.2	40.9	25.2	198.4	—14.2	188.0	— 7.9
82		4	46	5	O	309.8	44.5	320.8	35.5	259.2	+12.6	256.0	+ 0.6
83		5	2	2	L	101.8	76.5	114.8	55.0	204.6	+49.[illegible]	170.2	+50.5
84		6	32	2	L	128.8	30.5	140.8	19.0	130.1	+47.6	106.6	+47.0
85	13	14	44	3.4	Sa	24.0	38.0	31.0	27.0	208.9	— 1.1	199.8	— 9.8

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
86	13 16 1	2	L.O	193.0	17.0	197.8	12.5	24.6	+57.1	19 4	+51.4
87	13 18 7	1.2	Sa	4.0	35.0	8.0	22.0	225.1	— 6.7	220.5	+19.4

Nr. 11 stationäres Meteor.
» 13 nebelartig; sehr schnell
» 20 sehr schönes Meteor. Bahn ein wenig nach aufwärts gekrümmt. Die Schweifspuren blieben dem freien Auge länger als 10^s sichtbar.
» 24 und 36 nebelartig.
» 25 Schweifdauer 2^s
» 37 durchlief seine kurze Bahn sehr langsam; Nr. 38 sehr schnell.
» 41 sehr langsam.
» 42 Schweifspuren lang sichtbar; lief Zickzack.
» 46 und 80 Mitte sehr kurzer Bahnen.
» 51 Schweifspuren, die nach Süden trieben, blieben im Kometensucher $3\frac{1}{4}^m$ lang sichtbar. Der letzte Punct verschwand Az = 311° H = 31.°.
» 67 nach abwärts gekrümmte Bahn. Der tiefste Punct lag Az = 8.°8 H = 59.°5.
» 80—84 Wegen Häufung der Meteore die Zeitangaben unsicher.

Die Beobachtungen wurden begonnen um 9^h 5^m, geschlossen um 13^h 25^m. Am meisten vertreten war der Radiant in der Nähe von Wega.

1870 April 20. Troppau.

Beobachter: Palisa und Merklas.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	8 37 24	3	P	237.5	45.0	236.5	55.0	234.2	+51.9	218.9	+56.2
2	38 24	2*	M	85.5	64.0	80.5	50.5	124.2	+41.7	112.7	+31.6
3	39 24	2*	P	236.5	25.5(!)	207.5	23.5	258.1	+40.6	291.2	+56 0
4	48 19	2*	P	231.5	53.5	229.5	65 5	225.7	+58.7	202.1	+60.3
5	8 55 44	2*	P	235.5	31.0	218.0	26 5	257.6	+44 8	279.0	+52.8
6	9 2 44	4	M	156.0	33.5	151.5	31.5	43 9	+65.9	45.9	+61.9
7	10 59	3	P	282.5	52.0	290.5	50.0	212.8	+31.1	210 2	+26.2
8	15 29	1	P	106.0	30.5	102.0	13.0	89.1	+32.8	78.6	+19.3
9	20 4	6	P	234.5	48.5	207.0	44.0	241.2	+55.6	268.3	+70.8
10	23 29	5	P	278.5	40.0	271.0	38.5	227.8	+24.8	233.6	+27.8
11	31 24	3	P	263.5	33 5	273.5	36.6	244.3	+28.9	235.9	+24.7
12	9 55 34	2.3	P	263.5	59.5	258.0	57.0	223.8	+44.1	228.8	+45.7
13	10 0 49	3*	M	156.0	37.0	155.5	24.0	62.7	+68.6	45 9	+57.9
14	7 52	4	M	195.0	40.5	195.5	35.0	309.6	+75.9	321.8	+71.3
15	20 9	3	P	282.5	33.0	295.0	30.5	244.6	+17.5	237.7	+ 8.9
16	24 52	2	P	224.5	36.0	216.0	30.5	283.2	+55.2	299.0	+56 9
17	38 19	5	P	305.2	57.5	308.5	44 0	222.4	+26.4	225.5	+14.1
18	38 26	3	P	207 0	62.0	188.5	73.5	230.5	+70.8	196 0	+66.2
19	47 24	3	M	159.0	20.5	157.0	15.0	49.3	+56.2	48.6	+50.5
20	10 57 29	2.3	P	243.5	54.5	254.5	57.5	252.8	+52.2	244.9	+47 5

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
21	11 2 14	5 6	P	107.5	46.0	93.5	37.5	130.6	+43.3	130.2	+29.9
22	2 54	3.4	P	252.5	67 5	209 5	65.5	231.9	+51.3	229.4	+68.3
23	6 49	4	M	188.5	49.5	174.5	49.5	288 4	+84.8	107.2	+86.7
24	10 44	5	P	316.5	58.5	330.5	53.5	221.3	+24.2	115.9	+16.3
25	12 54	5	M	111.5	23.0	103.5	18.5	108.2	+31.1	110.9	+22.7
26	13 29	4	P	273.0	47.5	218.5	49.5	252.2	+32.8	246 2	+29.9
27	20 4	4	P	298.5	62.0	284.5	65.5	229.7	+32.1	231.5	+39.0
28	37 19	3	P	342.5	47.5	350.5	58.5	216.8	+ 8.6	210.1	+18.7
29	40 49	♀	P	316 5	24.5	299.0	20 5	245.1	— 6.2	260.9	— 1.4
30	43 9	5	P	317.0	59.0	326.5	61.0	229.0	+24.5	223.3	+24.1
31	43 39	3	P	10 0	55.5	37.5	50.0	200.5	+15 7	182.6	+14.9
32	45 34	1*	P	295.0	26.0	307.5	16.5	161.8	+ 5.2	157.3	− 9.1
33	51 31	4	M	352.5	11.0	344.0	18.5	216.7	−28.7	226.8	—29.9
34	56 19	4	M	287.0	39.5	273.5	27.5	261.4	+20.1	278.7	+18.5
35	11 58 29	3	P	280.0	54.0	295.5	56.5	254 2	+33.6	244.9	+29.0
36	12 1 19	1	P	304.5	32.0	316.5	25.5	255.4	+ 5.4	249.4	— 5.3
37	3 9	1	P	346.5	25.5	3.0	18.0	223.9	—13.6	208.2	—22.1
38	3 44	4	M	254.5	20.0	252.0	15.5	299 7	+25.1	305.0	+23.4
39	13 39	5.6	M	219 5	14.5	217.0	13.0	337.6	+42.3	341.5	+42.4
40	16 24	2	M	206.5	38.5	203.0	33.5	326.0	+68.0	340.4	+66.6
41	22 29	2	P	321 0	15.0	323.0	11.0	255.5	—16.6	255.5	—21.1
42	27 44	2	P	332.0	26.0	342.0	22.0	242.9	—10.0	235 0	—16 3
43	37 49	2	M	104.0	79.0	60.0	80.5	202.8	+51.3	208.5	+44.5
44	12 49 24	2	P	119.0	25.0	105.0	19.0	128.2	+37.4	134.3	+24.1

Nr. 1 nach Westen gekrümmt.
» 2, 8, 29 und 32 gelb.
» 4 Dauer 2ˢ
» 5 Dauer 3ˢ
» 7, 9, 21 und 25 schnell.
» 8 Dauer 2ˢ
» 13 Dauer 1ˢ
» 14 endete in β Cephei.
» 20 nach unten stark gekrümmt.
» 28 nach Osten gekrümmt; Lichtintensität abnehmend.

1870. April 20. Kremsmünster.

Beobachter: Prof. Strasser.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	9 56	6		.	.	.	.	171.9	+74.5	173.9	+65.6
2	10 9	6		.	.	.	.	260.8	+59.4	218.5	+18.7
3	10 41	6		.	.	.	.	182.6	+61.5	168.5	+53.0

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
4	11 3	2		.	.	.	.	280.8	+58.0	268.0	+58.8
5	29	2		.	.	.	.	115.8	+63.2	138.1	+44.7
6	31	2		.	.	.	.	123.3	+63.5	117.3	+56.0
7	32	3		.	.	.	.	128.9	+68.5	156.3	+51.9
8	34	6		.	.	.	.	134.9	+56.9	110.8	+42.6
9	11 56	4		.	.	.	.	116.2	+82.0	133.0	+45.9
10	12 1	2		.	.	.	.	255.1	+53.1	271.4	+49.9
11	7	1		.	.	.	.	185.0	+69.0	129.0	+75.9
12	15	2		.	.	.	.	270 9	+66.9	288.1	+73.2
13	12 18	3		.	.	.	.	196.0	+46.5	191.2	+ 8.5

1870. April 20. Krakau.

Director: Karlinski.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	12 2.9	1		.	.	.	.	185	—16	178	—22
2	28.9	1		.	.	.	.	208	— 9	195	—19
3	12 42.9	1		.	.	.	.	200	— 1	188	— 5

Bis 12 Uhr ganz trüb; nach 12 Uhr heiterte es sich auf, nur am Westhimmel blieben noch Wolken bis Coma Berenices. Das letzte Meteor schon wieder zwischen Wolken, welche den ganzen Himmel neuerdings sehr rasch bedeckten.

1870. April 21. Wien.

Beobachter: Prof. v. Oppolzer, Schulhof, A. v. Littrow, Sauter und Donat.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	8 50 39	2	O	192.0	24.5	180.0	22.0	316.6	+64.5	342.6	+63.8
2	51 44	1	Sch	206.5	27.0	195.5	13.0	288.9	+60.4	317.3	+52.6
3	8 57 9	6	O	240.5	15.0	240.5	14.0	266.2	+30.7	267.0	+29.9
4	9 33 58	2	O	211.5	57.5	.	.	225.0	+69.0	.	.
5	9 59 40	1*	Sa	21.5	52.5	41.5	26.5	166.4	+12.4	143.0	— 6.7
6	10 2 38	2	L	329.0	63.5	5.0	61.5	195.1	+14.3	177.8	+19.8
7	4 9	2	Sa	82.5	40.5	61.5	33.5	124.7	+24.7	132.9	+ 8.4
8	4 33	4	O	147.5	25.0	142.5	21.0	60.3	+55.5	62.1	+49.6
9	11 6	2.3	Sa	48.5	33.5	60.5	26.5	143.8	+ 2.6	131.3	+ 2.2
10	10 12 7	2.3	Sa	85.5	34.5	102.5	21.5	120.2	+22.3	98.8	+24.1

Nr.	Mittlere Wiener Zeit			Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
						A	H	A	H	AR.	Decl.	AR.	Decl.
	h	m	s			°	°	°	°	°	°	°	°
11	10	17	20	3.4	L	289.0	36.5	297.0	39.5	236.2	+15.6	229.2	+13.4
12		17	36	1*	L.Sch	291.0	17.5	197.0	5.5	247.0	— 0.2	249.8	— 13.3
13		18	50	3.4	Sa	56.0	56.5	68.0	44.5	154.2	+24.6	139.6	+20.1
14		25	37	3	O.Sch	203.5	23.0	204.7	19.8	321.2	+58.7	322.4	+55.3
15		27	47	3	L	253.0	25.5	255.0	25.5	270.7	+29.8	269.3	+28.6
16		29	6	2	L.O	174.2	29.0(!)	159.7	22.8	22.5	+70.2	46.5	+59.8
17		32	16	1	L.D	0.5	12.5	4.0	5.0	187.2	— 29.3	182.8	—36.7
18		34	56	6	L	223.0	18.5	217.0	17.5	303.8	+44.4	311.2	+47.1
19		35	30	5	Sa	40.0	23.5	53.0	19.5	151.9	— 9.8	139.2	— 7.4
20		36	10	2.3	Sch.O	213.7	35.7	200.1	38.2	294.1	+62.0	323.8	+64.6
21		37	58	3	L	225.0	14.5	218.1	12.5	305.8	+40.0	314.8	+42.4
22		38	2	2	O.L.Sch	189.3	28.7	178.5	21.0	344.5	+69.0	12.4	+62.7
23		40	32	2.3	Sa	356.0	38.5	14.0	28.5	193.1	— 3.2	177.2	— 12.3
24		43	32	3	L.Sa	45.5	52.0	55.0	45.5	163.1	+17.4	154.1	+15.3
25		49	23	3.4	L	230.0	56.5	224.0	67.0	247.6	+59.1	226.1	+60.8
26		51	25	3.4	Sa	8.5	15.5	45.5	12.5	183.5	—25.9	150.8	— 8.4
27		54	17	2*	L.Sch.O	185.0	54.5	161.0	51.0	117.9	+83.0	123.2	+77.4
28		54	34	3.4	Sa	69.5	61.5	101.5	51.5	161.2	+32.9	138.6	+41.8
29		55	47	5	Sa	35.5	34.5	43.5	25.5	165.1	— 1.5	155.0	— 6.6
30	10	59	30	2.3	L	147.0	21.5	145.0	16.0	70.9	+52.5	68.5	+47.0
31	11	1	47	4.5	Sa	62.5	26.5	73.5	19.5	142.6	+ 3.3	130.2	+ 4.0
32		2	22	2.3	Sch	198.5	19.5	180.5	16.5	341.4	+57.6	14.5	+58.3
33		3	35	3	O.Sch.L	244.0	33.2	236.7	30.5	278.8	+40.7	286.8	+44.0
34		4	40	3	O.L	208.5	44.0	188.5	38.5	287.3	+69.9	340.4	+78.4
35		5	1	4.5	Sa	70.5	70.5	99.5	61.5	172.1	+39.0	154.2	+45.1
36		7	29	3.4	Sa	15.5	66.5	33.5	59.5	189.8	+25.4	179.2	+21.1
37		11	16	4	O	180.5	36.0	185.5	29.5	15.6	+77.8	2.9	+70.9
38		14	1	2	O	128.5	82.0	72.0	73.5	187.9	+52.8	177.3	+41.0
39		15	27	2	D	8.5	28.5	26.5	18.5	190.9	—13.0	171.9	—19.2
40		25	28	5	O	233.5	22.0	225.5	20.0	303.3	+40.3	312.5	+44.0
41		40	20	3	Sch	338.0	69.5	317.0	51.5	213.5	+28.9	231.2	+16.3
42		40	37	6	L	254.0	29.0	251.0	14.0	285.2	+31.5	291.6	+30.1
43		44	22	3.4	Sa	78.0	79.5	58.0	61.5	191.4	+45.0	178.3	+29.1
44		46	49	3.4	Sa	148.0	69.5	108.0	59.5	181.8	+63.7	159.9	+48.4
45		49	37	5	Sch	236.0	53.5	256.0	40.5	267.4	+55.2	275.4	+37.4
46		54	18	3	L	73.0	65.0	87.0	57.5	178.3	+36.4	165.2	+37.3
47		55	25	2.3	Sa	88.0	20.5	82.0	13.5	133.9	+13.8	133.5	+ 4.8
48		56	38	6	L	294.0	36.5	283.0	34.5	257.8	+13.0	266.2	+17.3
49		57	4	5	O.Sch	222.0	36.5	216.5	35.0	304.2	+57.3	311.5	+60.0
50	11	57	58	4	L.Sa	56.0	28.2	69.0	23.5	162.4	+ 1.5	150.1	+ 4.4

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
51	11 58 23	6	O Sch	213.3	38.3	216.5	36.3	309.6	+64.0	309.8	+60.8
52	59 0	4	L	38.0	40.5	48.0	36.5	181.5	+ 4.9	172.7	+ 4.9
53	11 59 27	6	O	210.5	44.5	207.5	39.0	298.3	+68.8	314.5	+68.2
54	12 1 59	3	L	326.5	14.0	332.5	10.5	245.3	−21.0	240.8	−26.5
55	5 1	2.3	Sa.D	66.0	76.5	80.0	58.5	194.5	+41.4	172.0	+35.1
56	7 57	4.5	Sa	148.0	87.5(:)	141.0	76.5(:)	209.8	+50.4	195.8	+57.8
57	9 0	3	L	276.0	54.0	189.5	55.0	257.0	+34.[illegible]	250.2	+28.9
58	12 11	5	D Sch	196.5	60.5	208.5	57.5	244.3	+74.5	263.5	+70.6
59	12 50	4	O.Sch	234.5	55.5	234.5	48.0	269.6	+56.5	282.3	+54.5
60	13 17	5	L	128.0	5 .5	135.0	55.5	161.7	+58.2	155.1	+61.8
61	15 49	6	O	177.5	44.0	280.5	43.5	267.0	+27.0	265.8	+25.2
62	19 54	2	Sa	100.5	61.5	113.5	45.5	173.0	+45.5	147.3	+45.8
63	20 27	4	L	107.0	46.5	111.0	44.5	151.7	+42.5	147.4	+43.8
64	21 43	4	D.Sa	103.5	68.5	112.5	55.5	182.6	+48.6	161.7	+49.4
65	22 25	3 4	L	68.0	30.5	66.0	27.5	161.3	+ 9.4	160.8	+ 5.9
66	23 8	2	Sch	5.5	31.0	21.5	28.5	210.9	−10.6	196.4	−10.9
67	25 24	8	O	306.5	45.5	.	.	251.9	+14.7	.	.
68	25 55	4	Sch	225.5	78.5	252.5	58.5	230.8	+55.5	264.2	+47.8
69	26 31	2	D.O L.	208.7	41.3	206.0	30.3	313.6	+68.3	338.7	+63.2
70	31 41	4	L	7.0	60.5	27.0	57.5	214.1	+18.8	202.9	+18.0
71	37 23	3	O	210.5	20.0	205.5	17.0	347.3	+52.6	356.7	+52.6
72	38 28	4	Sch	195.5	35.5	194.5	21.5(:)	351.7	+72.8	10.7	+60.9
73	42 29	2	L	324.0	21.5	330.0	16.5	254.7	−13.2	251.2	−19.9
74	43 5	3	O	237.5	36.0	127.5	34.0	304.9	+46.8	314.8	+52.1
75	44 1	2	O	101.5	69.0	195.5	56.0(:)	189.2	+48.1	265.6	+77.8
76	45 44	3	L	340.0	41.5	351.0	36.5	236.2	+ 1.5	228.5	− 4.9
77	46 22	2	L.Sa	34.0	45.5	62.0	62.0(!)	198.1	+ 8.2	192.5	+30.8
78	47 8	4	Sch.O	207.5	45.0	202.7	41.3(!)	311.0	+71.0	326.6	+72.4
79	54 1	4	O	236.5	21.0	229.5	18.0	323.9	+37.7	332.7	+40.0
80	12 56 44	4	L	77.0	57.5	74.0	49.5	185.2	+33.3	179.7	+26.6
81	13 5 27	2	L	64.0	51.0	73.0	43.5	188.2	+23.4	177.8	+21.8
82	9 26	3*	L	162.0	14.0	62.5	59.0	125.3	+76.9	195.7	+28.7
83	13 0	2	L	315.0	34.0	334.0	22.5	256.6	− 2.1	253.0	−15.5
84	16 11	3	L	145.0	53.5	145.5	43.0	165.7	+67.5	139.6	+65.6
85	24 8	4	L	328.0	58.0	342.0	50.5(:)	248.2	+19.5	242.5	+10.0
86	26 16	4	L	49.0	33.5	61.0	25.5	192.3	+ 2.7	179.2	+ 1.7
87	26 17	.	Sch	55.5	49.5	66.5	34.5	196.9	+18.8	180.8	+11.7
88	31 4	2.3	L	319.0	43.0	303.5	42.0	261.6	+ 8.1	272.1	+13.1
89	40 9	1	L	246.0	39.5	231.0	32.5	309.8	+43.2	328.2	+49.0
90	13 40 51	3	L	180.0	46.0	192.0	36.5	235.1	+87.8	13.7	+75.3

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
91	13 41 5	2	O	151.5	18.5	173.5	8.0(:)	71.2	+59.5	65.0	+49.3
92	46 4	3	L	81.0	62.5	70.0	55.5	201.1	+37.8	198.9	+29.0
93	51 4	2	O.L	238.7	64.3	309.3	71.5	178.2	+55.2	255.1	+35.1
94	52 49	6	L	229.0	21.5	217.0	20.0	344.8	+43.0	358.5	+49.1
95	53 59	3	L	83.0	32.5	.	.	175.8	+19.3	.	.
96	13 58 4	3.4	D	347.5	18.5	348.5	13.5	252.3	−22.3	252.0	−27.4
97	14 0 19	2.3	L.O	266.5	22.0	258.2	15.0	317.3	+18.5	328.5	+19.0
98	1 3	3	L.D.Sch	308.0	23.0	316.0	19.2(:)	286.8	− 4.9	282.2	−11.9
99	6 3	4	O	334.0	51.5	342.0	39.0	257.5	+12.1	255.3	− 1.3
100	8 44	5.6	L	42.0	67.5	19.0	69.5	224.9	+30.0	234.6	+28.5
101	15 27	4.5	O	137.0	24.0	132.0	37.5	158.4	+59.4	154.8	+53.8
102	14 16 15	3	L	294.0	25.5	294.0	11.5	299.7	+ 4.4	308.3	− 6.7

Nr. 4 fast stationäres Meteor. Azimuth und Höhe etwas abnehmend.
» 17 und 98 schwach gekrümmte Bahnen.
» 28 und 37 intermittirend; schienen mehrfach aufzuleuchten. Um 11^h 32^m 52^s sehr helles Meteor von Venusgrösse in WNW links von Castor und Pollux in beiläufig derselben Höhe.
» 60 fast gleichzeitig eine zweite Sternschnuppe mit sehr kurzer Bahn in der Nähe des Polaris.
» 65 und 92 nebelartig.
» 67 Mitte einer sehr kurzen, im Kometensucher gesehenen Bahn.
» 93 lief zickzack.
» 95 stationäres Meteor.

Ausser den durch die stationären Meteore angedeuteten Radianten war auch der Leierradiant vertreten.

1870. April 21. Troppau.

Beobachter: Palisa.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	8 50 32	2		123.0	55.0	105.0	43.0	104.9	+56.0	96.5	+40.1
2	9 0 45	5		206.0	44.0	203.0	38.5	265.6	+71.4	283.1	+70.2
3	4 10	3		248.0	31.0	252.0	35.0	251.2	+37.0	244.6	+37.0
4	17 11	2		356.0	74.0 (:)	288.0	75.5 (!)	172.0	+33.9	189.9	+43.6
5	9 30 10	2*		143.0	61.0	99.0	54.0	126.4	+66.8	121.7	+42.8
6	10 10 45	2		156.0	65.5	141.0	45.5	154.7	+70.0	99.7	+63.8
7	18 50	2		302.0	38.5	310.0	35.0	228.8	+12.1	225.3	+ 5.8
8	22 15	3		259.0	59.0	243.0	56.5	233.7	+46.1	242.0	+53.2
9	27 45	3		316.0	32.5	323.5	29.5	224.3	+ 1.3	219.7	− 4.2
10	10 29 5	2		105.5	35.5	104.0	27.5	113.5	+35.8	107.5	+29.5

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
11	10 31 35	3		351.0	39.0	358.0	36.0	196.3	− 0.7	191.0	− 4.1
12	38 10	3		246.0	39.0	230.0	41.0	268 0	+43.3	176.0	+54.5
13	40 25	2		21.0	17.0	34.5	11.0	170.0	−20.6	154.7	−22.0
14	52 45	5		203 5	32.5	207.0	31 0	320.7	+65.4	317.9	+62.4
15	54 15	2		149 0	25.0	139.0	20.0(:)	70.5	+55.5	77.5	+45.9
16	54 45	3 4		315.0	51.5	339.0	52.0	222.7	+18.4	208.2	+13.5
17	10 59 30	3		104 0	17.5	102.0	13.5	107.3	+22.3	106.0	+18.0
18	11 3 35	4		344 0	46.0(:)	353 0	41 0(!)	208.6	+ 6.9	202.6	+ 1.1
19	7 52	3		314.5	45 5	302 0	43.5	229.3	+13.3	238.2	+16.2
20	11 15	4		29.5	29.5	52.0	26.0	173.8	− 6.5	154.1	− 1.2
21	15 23	2		232.0	25 0	222.0	23.0	302.4	+43.1	313.9	+47.7
22	17 34	4		153 5	60.5	226.5	48.0	156.7	+71.8	276.3	+60.0
23	17 36	2		205 0	24.0	198.0	20.5	335.0	+57.7	348.5	+57.4
24	21 24	2		258.0	32.0	259.0	28.0	277.8	+31.3	280.4	+28.0
25	25 28	3		299.0	50.0	293.0	47 0	240.5	+22.7	245.8	+22.9
26	32 40	1		74.5	15.0	74.0	0.0	135.9	+ 1.8	126.9	−10.2
27	36 20	6		260.0	36.5	252.5	33.5	276.4	+33.1	283.9	+35.8
28	57 0	3		10.0	45.0	22.5	35.0	203.6	+ 5.3	192.3	− 2.7
29	11 58 10	3		25.5	45.0	23.0	39.0	193.1	+ 7.5	193.3	+ 1.3
30	12 22 32	6		255.5	39.5	262.0	34.0	287 9	+37.7	288.8	+30.2
31	28 52	5		22.0	40.0	27.0	37.0	202.0	+ 2.0	197.4	+ 0.1
32	36 38	3		271.5	38.5	287.0	34.5	282.6	+27.7	275.9	+16.1
33	36 50	2*		264.0	22.5	250.0	25.0	300.0	+20.8	308.3	+31.6
34	37 40	2.3*		219.5	44.5	196.0	44.5	308.0	+63.0	332.2	+78.0
35	38 55	2		274.5	22.0	274.5	16.5	293.4	+14.0	297.2	+ 9.8
36	48 55	5		269.0	55.0	282.5	67.5	271.6	+39.2	253.3	+40.8
37	54 0	2		300.0	38.0	282 0	37.0	269.3	+12.7	281.7	+20.8
38	12 57 0	5		321.0	27.0	325.0	24.0	260.1	− 5.8	258.4	− 9.8
39	13 2 30	6.7		294 5	37.5	270.0	31.5	275.5	+14.6	295.7	+23.7
40	3 35	3		288.0	23.0	294.5	21.0	289.2	+ 6.7	285.5	+ 1.4
41	3 36	3		276.0	23.0	265.0	19.0	297.9	+13.7	308.5	+17.7
42	5 10	2		326.5	24 0	328.5	21.0	258 6	−10.3	257.9	−13.8
43	5 15	6		316.0	34.0	324 5	34.5	263.1	+ 2.6	256.5	− 0 9
44	13 37	5		216.0	56.0	201.0	53.5	290.2	+67.9	296.8	+76.7
45	17 50	3*		308.5	42.0	303.5	44.0	267.6	+12.4	269.6	+16.0
46	24 10	3		238.5	30.5	238.5	26.0	323.9	+42.8	328.4	+39.7
47	29 5	3		171.0	48.5	152.0	44.5	131.3	+84.3	138.7	+70.4
48	31 15	2		235.0	55.0	222.0	41.0	293.9	+57.1	325.3	+59.7
49	32 5	3*		265.0	47.0	238.0	66.0	292.6	+36 8	273.7	+56.8
50	32 35	3.4		274.0	41.0	274.0	35.5	293.2	+27.9	297.4	+23.9

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
51	13 36 30	5.6		297.0	32 0	297.0	10.5	285.7	+ 9.1	298.6	— 8.5
52	41 20	2		1.0	47.5	17.0	39.0	236 2	+ 7.4	323.7	+ 0.2
53	13 43 55	3		278.0	63.5	.	.	272.8	+40.1	.	.

Nr 5, 16, 33 und 52 roth.
» 8 Dauer 1ˢ.
» 9 endete in μ Virginis.
» 16 sehr schnell.
» 20 und 26 Dauer 2ˢ.
» 24 an Intensität zunehmend.
» 28, 31, 41 und 43 schnell.
» 37 nach unten gekrümmt.
» 47 die Verlängerung der Bahn zielte auf den Polarstern.
» 53 stationäres Meteor.

1870. April 21. Kremsmünster.

Beobachter: Prof. Strasser.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	10 34	4		.	.	.	.	196.9	+78 8	146.0	+54.5
2	38	2		.	.	.	.	262.8	+55.5	263.4	+68.3
3	10 51	3		.	.	.	.	149 5	+63.3	160.3	+57.1
4	11 5	3		.	.	.	.	148.1	+62.1	121 1	+59.7
5	13	5		.	.	.	.	153.4	+71.8	136.5	+70.9
6	24	5		.	.	.	.	210.6	+85.2	141.3	+80.7
7	33	1		.	.	.	.	125.4	+45.6	112.2	+34.9
8	35	3		.	.	.	.	259.3	+71 7	261.1	+40.4
9	37	4		.	.	.	.	276.8	+64.7	251.3	+70.4
10	51	4		.	.	.	.	285 5	+57.7	294.9	+44.3
11	11 58	6		.	.	.	.	165.1	+66.6	149.6	+58.4
12	12 2	6		.	.	.	.	162.7	+85.3	161.0	+77.9
13	12 27	6		.	.	.	.	300.5	+40.4	296.2	+36.6

1870. April 21. Krakau.

Director: Karlinski.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	10 26.8	3		.	.	.	.	116	+26	111	+15
2	37.8	1		.	.	.	.	125	+ 5	112	+11
3	10 42.8	2		.	.	.	.	174	+14	165	+13
4	11 4.8	2.3		.	.	.	.	143	+ 5	132	+ 1
5	11 36.8	3		.	.	.	.	133	+15	132	+ 7

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
6	11 41.8	2		.	.	.	.	172	— 8	165	—16
7	11 56 8	4		.	.	.	.	157	+11	154	+ 9
8	12 37.8	1		.	.	.	.	190	+57	134	+48
9	53.8	1		.	.	.	.	214	+15	202	+21
10	13 8.3	3.4		.	.	.	.	153	+41	153	+30
11	13 17.8	2.3		.	.	.	.	218	+14	206	+17

Nr. 10 sehr langsam. Dauer 1ˢ5 bis 2ˢ0.

Die Beobachtungen wurden um 10^h 30^m begonnen. Ausser den eben mitgetheilten wurde, aber leider zu spät zum Einzeichnen noch um 11^h 30ᵐ9 ein Meteor erster Grösse zwischen Capella und Gemini bemerkt.

1870. April 22. Wien.

Beobachter: Prof. v. Oppolzer, Schulhof, A. v. Littrow, Sauter und Donat.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	9 8 55	3	O	223.5	16.0	214.5	14.3	284.8	+42.1	295.2	+45.9
2	20 45	4	O	271.5	41.5	263.5	40.5	229.6	+28.8	234.9	+32.8
3	22 14	5	O	250.5	54.5	253.0	47.5	225.3	+47 5	233.2	+43.0
4	23 13	5	O	161.0	25.5	168.5	27.0	31.6	+62.8	18 5	+67.1
5	32 1	4	L	294.5	46.5	301.5	43.5	215.9	+20.5	213.8	+15.1
6	34 36	3	Sch	226.0	37.5	219.0	27.5	264.8	+55.1	284.6	+53.6
7	38 32	5	L	265.0	46.5	268.5	44.5	232.7	+35.5	232.9	+32.4
8	9 56 14	.	L	296.5	25.5	297.5	18 5	233.8	+ 3.0	237.3	— 3.1
9	10 12 2	2.3	L.O	225.2	52.6	197.7	57.6	247.8	+61.3	223 9	+75.6
10	15 54	3	L	60.5	62.0	45.5	58.5	156.4	+30.3	160.8	+23.1
11	17 18	6	O	284.5	35.5	286.5	31.5	240.7	+17.3	242.2	+13.1
12	19 24	6	L	342.5	39.5	341.5	32.5	199.1	— 0.9	201.3	— 7.6
13	20 27	3.4	Sch	172.0	18.5	175.0	16.5	20.9	+59.6	14.9	+58.0
14	21 35	5	L	355.5	34.5	347.5	31.5	189.8	— 7.2	196.9	— 9.5
15	29 3	1.2*	L.Sch	112.5	28.2	102.5	20.5	152.5	+35 3	103.2	+23.4
16	30 11	2	L	99.5	34.0	103.5	30.0	116.6	+30.6	110.6	+30.5
17	32 34	2.3	Sa	90.0	24.0	95.0	20.0	115.4	+17.7	109.0	+18.1
18	36 11	6	L	245.5	35.5	.	.	269 4	+41.2	.	.
19	44 7	2	L.Sch	178.2	26.7	171.0	23.0	16.1	+68.4	31.0	+63.7
20	48 43	3	L	41.0	34.5	52.5	27.5	160.1	+ 0.4	148.2	— 0.9
21	56 53	2	O	216.5	21.5	218.5	19.0	314.5	+50.5	314.7	+47.4
22	10 58 59	3	Sch	267.0	53.5	290.0	50.5	244.7	+38.4	237.0	+25.5
23	11 0 59	4.5	Sa	45.0	17.0	59.0	12.0	151.9	—13.4	137.5	—10.4

Nr.	Mittlere Wiener Zeit			Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
						A	H	A	H	AR.	Decl.	AR.	Decl.
	h	m	s			°	°	°	°	°	°	°	°
24	11	20	29	1*	L	334.5	25.0	332.5	15.5	224.6	13.2	229.6	-21.8
25		23	17	4	L	287.0	66.5	260.5	75.5	230.2	+37.3	223.6	+48.5
26		33	32	4	W	151.7	18.0	156.5	32.0	124.3	+71.2	80.3	+66.0
27		34	32	4	L	43.5	68.5	40.5	59.5	187.2	+31.1	183.5	+22 7
28		35	59	4	L	153.5	34.0	149.5	33.5	88 8	+65 7	93.2	+63.0
29		38	13	6	L	57.5	35.5	49.5	33.5	161 3	+ 8 1	165.8	+ 2.9
30		41	16	5	L	35 5	34.5	38.5	36.5	177.5	— 1.5	176.1	+ 1.3
31		42	54	4	Sch	167.0	14.5	164.0	11.5	48 6	+54.7	51.9	+51.0
32		43	7	3	L	150.5	22.5	142.5	18.5	79.6	+55.2	85 4	+47.6
33		44	0	4.5	L	95.5	26.5	89.5	25.5	131.4	+23.0	134.7	+18.4
34		44	56	4	W	350.5	31.2	352.5	32.5	215.3	—10.3	213.5	— 9.0
35		45	27	6	L	88.5	50.5	90.5	46.5	156 7	+34.4	151 9	+33.1
36		48	15	2.3	L.Sch	118.5	32.5	120.3	20.3	122.3	+42.0	109.2	+35.0
37		49	59	3	L	232.5	84.5	210.5	76.5	215.3	+51.4	221.8	+59.2
38		51	30	3	Sch.L	35.8	49.5	52.6	50.3	185.8	+12.6	176.2	+18.6
39		53	43	4.5	Sa	90.0	31 0	99.0	23.0	141.0	+22.6	128.8	+22.8
40		54	56	4.5	Sa	81.0	52.0	97.0	53.0	163 9	+31.5	158.1	+40.1
41		54	58	3	Sa	81.0	40.0	92.0	18.0	153.9	+23.5	130.3	+14.6
42	11	57	6	3	L'	15.5	14.5	20.5	9 5	193.3	—25.7	186.7	—29.5
43	12	2	21	5	O	207.5	33.5	209 5	28.5	326 9	+64.8	331.7	+59.9
44		3	17	3	L	191.5	39.0	210.5	40.5	345.5	+77.5	309.8	+67 0
45		3	23	5	Sch	217.0	23.5	208.0	21.5	328.5	+51.7	341.7	+55.2
46		6	44	3	O	304.5	52.5	322.5	50 8(!)	245.0	+21.2	235.9	+14.0
47		10	11	2*	Sch	133.5	49 5	134.5	38.3	143.7	+60.0	124 1	+55.9
48		11	20	2.3	Sa.L	49.8	17.5	37.3	28.5	165.7	—10.5	181.0	— 6.1
49		12	33	4	L	48.5	30.5	66.5	31.5	173.7	0.1	161.4	+ 9.4
50		13	39	4	L	128.5	38.5	120.5	32.5	129.0	+52.1	127.3	+43.4
51		19	40	2*	W	45.5	26.5	48.5	20 0	175.8	— 4.8	170.2	— 9.2
52		19	55	5	L	108.5	59.5	107.5	55.5	169.1	+48 6	163.8	+46.7
53		22	25	6	W	51.5	47.5	55.5	37 5	183.1	+15.6	174.9	+ 8 8
54		22	30	7	L	160.5	29.5	155.5	24.5	82.2	+66.0	84.3	+59 4
55		24	20	4	L	125.5	34.0	120.5	30.5	128.1	+47.5	127.9	+42.1
56		26	32	4	L	30.5	48.0	32.5	40.5	197.2	+ 9.7	193.3	+ 3.3
57		26	47	3	Sch	81 0	41.5	84.0	31.5	163.1	+24.5	153.5	+19.2
58		29	2	4	O	272.5	41.5	269.5	35.0	276.2	+28.2	283.4	+25.7
59		31	24	3	O.L	281.0	38.0	277.0	27.7	274.8	+20.8	284.6	+15.9
60		32	39	5	L	347.5	34.5	338.5	31.5	229.3	— 6.5	237.4	— 7.9
61		32	59	.	Sa	334 0	12.0	338.0	14.0	247.5	— 25 5	242.7	—24.8
62	12	39	52	6	O	207.5	24.0	207 5	19.5	349.3	+57.5	353.6	+53.7

Nr	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
63	12 40 0	1	L	260.5	63.5	249.5	46.5	260.2	+45.8	285.9	+44.5
64	41 56	3	O	214.5	65.0	222.5	61.0	256.1	+65.2	267.3	+62.9
65	46 29	2	L	313.0	62.0	330.5	58.0	245.0	+26.4	238.4	+19.0
66	12 52 48	2	L	224.5	40.5	214.5	36.5	310.9	+57.7	326.0	+62.3
67	13 4 23	5	L	332.5	35.5	317.5	31.5	249.0	— 2.8	254.3	— 5.1
68	12 39	4.5	Sa	112.0	59.0	91.0	39.0	180.8	+50.1	166.8	+28.6
69	12 41	6	L	12.5	39.5 (:)	11.5	34.5 (:)	219.4	— 1.6	219.5	— 6.6
70	14 0	1*	L.Sa	46.7	54.0	56.8	27.8	202.3	+19.6	181.5	+ 1.3
71	15 31	4	O	271.5	60.0	274.5	55.0	270.1	+39.5	274.3	+35.5
72	21 54	.	L	27.5	52.5	45.5	58.5	214.6	+13.4	207.4	+23.0
73	23 13	2.3	Sa	128.0	46.0	138.0	37.0	157.9	+55.2	137.1	+57.6
74	24 52	6	L	11.5	61.5	9.5	64.0	226.3	+20.1	227.6	+22.4
75	32 24	3.4	L	19.0	47.5	29.0	40.5	221.0	+ 7.1	212.2	+ 2.4
76	37 39	5	L	110.5	56.5	103.5	52.0	183.8	+48.6	180.3	+43.1
77	37 51	4	O	218.5	17.5	212.5	10.4	356.3	+46.3	8.5	+43.5
78	41 14	5	O	298.5	32.0	311.5	30.7	284.9	+ 7.2	276.3	+ 0.1
79	45 12	6	L	135.5	61.5	127.5	50.5	192.0	+61.9	171.3	+56.4
80	48 22	5	O	183.5	24.5	178.5	22.0	50.1	+66.1	61.2	+63.7
81	52 11	2	O	192.5	22.5	192.8	16.3	33.2	+62.4	36.3	+56.5
82	13 55 54	2	L.Sa.O	44.7	53.0	76.0	47.2 (:)	213.6	+18.0	192.8	+25.8
83	14 4 51	3.4	L	69.0	64.5	63.5	55.0	212.8	+34.7	207.2	+26.2
84	10 55	3	L	24.5	59.0	48.5	55.5 (:)	230.6	+19.0	216.5	+20.9
85	13 3	2	O	286.5	21.0	290.5	18.5	308.0	+ 5.2	306.7	+ 0.8
86	13 42	2	L	115.5	63.5	128.5	58.5	202.7	+52.6	192.8	+58.5
87	14 30	2	L.Sa	76.2	70.2	136.5	58.5	218.9	+40.4	192.9	+62.7
88	18 22	4	L	334.5	37.5	332.0	29.0	265.5	— 1.3	270.1	— 8.8
89	19 9	3.4	Sa	3.0	66.0	343.0	59.0	244.3	+24.2	254.9	+18.2
90	19 56	3	L	41.5	24.5	55.5	22.5	208.3	— 8.3	196.2	— 3.6
91	24 0	3	L	19.5	59.5	4.5	63.5	236.5	+18.9	244.7	+21.8
92	29 23	5	Sa	348.0	33.0	9.0	36.0	258.3	— 8.1	240.9	— 5.4
93	29 38	4	L	347.5	53.5	338.5	47.5	255.9	+12.3	262.8	+ 7.4
94	34 46	2.3	Sa	321.0	70.0	295.0	64.0	264.3	+31.6	278.0	+33.1
95	38 33	5	O	205.5	21.0	205.8	18.0	24.6	+56.3	26.9	+53.4
96	40 34	2	L	28.5	62.0	61.5	47.5 ( )	237.0	+22.5	211.9	+19.5
97	40 52	3	L	55.5	54.0	71.5	45.5	219.5	+22.4	205.1	+22.6
98	44 4	6	L	265.5	29.5	249.5	31.5	324.2	+24.4	332.9	+36.0
99	44 10	2	Sa	79.0	29.0	74.0	23.0	189.4	+14.5	188.9	+ 7.0
100	14 47 6	5.6	L	358.5	35.0	344.5	36.0	254.0	— 6.8	265.2	— 4.7

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
101	14 51 54	3.4	Sa	339.0	46.0	322.0	36.0	268.5	+ 5.9	283 8	+ 0.7
102	54 38	3	O	352.5	75.0	60.5	70.0	256 9	+33.2	232.9	+36.0
103	14 55 33	4	L	122 5	72.5	151.5	74.5	248 6	+54.9	239.5	+61.8
104	15 2 3	4	L	101.5	56.0	97.5	43.0	207.0	+43 8	194.3	+34.9

Nr. 8, 35, 72 und 98 nebelartig.
» 18 Mitte einer sehr kurzen Bahn.
» 24 Um 11^h 17^m5 strahlten aus dem Punkte Az = 298.°5 H = 9°5 [α = 256°1 δ = — 2°9] fast gleichzeitig 5 sehr kleine Meteore aus.
» 38 nach unten gekrümmte Bahn
» 44 nach aufwärts gekrümmte Bahn. Höchster Punct Az = 202°5 H = 41°5.
» 58 langsam.
» 61 sehr kleines Meteor, nach einer Beobachtung im Kometensucher eingestellt
» 82 Nachdem A. v. Littrow schon mehrfach Meteore gesehen, die auf einen Radianten zwischen den Füssen des Bootes schliessen liessen, gelang es ihm denselben um 13^h 54^m durch ein im Kometensucher gesehenes, fast stationäres Meteor in Az = 31° H = 46.°5 (α = 218.°0 δ = + 8°4) zu fixiren
» 87 Licht intermittirend.
» 99 Lichtintensität nach und nach zunehmend.

Nebst den durch die stationären Meteore angezeigten Radianten waren noch der in der Leier und ein sehr nördlicher stark vertreten.

1870. April 22 Troppau.

Beobachter: Palisa.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	8 26 34	1*		233 0	62.5	175.5	56 5	204 7	+59.0	138.8	+82 8
2	35 9	1		194 0	43.5(:)	182.0	7.0 (!)	318 9	+51.8	338 3	+47.1
3	39 59	2		118 0	43.5(:)	123.5	40.5 (!)	88 4	+48.2	81.1	+50.1
4	47 36	2		267.0	24.5	259.9	20.5	239.9	+20 5	248 6	+22.5
5	48 34	3		299.5	28.0	305 5	24.0	214.8	+ 4.5	212.7	— 1.8
6	50 31	5		290.0	40.0	279 0	59.5	214 5	+18.8	204.2	+37.4
7	54 29	2.3		326.0	56.5	316.9	62.5	185 2	+20 1	187.2	+27 7
8	55 4	2		54.0	29.5	158 0	25.5	121.3	+ 2.7	115.8	+ 1.4
9	8 54 14	3		256.0	56.0	253 0	53.0	218.5	+46.2	223 6	+46.5
10	9 8 41	3		301.5	48.5	296.5	47 0(!)	206.7	+20.5	210.4	+21.3
11	9 21 4	3		270.0	39.0	272.5	36.0	235.1	+28 9	235.9	+25 3
12	10 6 34	4		216.5	48.0	211.0	44.0	264.5	+66.3	278 0	+68 3
13	13 32	5 6		184.5	59 0	253.5	63.5	223.3	+35 0	227.4	+50.0
14	30 14	3		190.0	47.0	156.5	47.0	301 9	+83.0	96.8	+74 2
15	32 54	3		314.0	35.0	321 0	33.5	226 8	+ 4.2	222.3	+ 0.3

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
16	10 54 23	2*		295.0	40.0	307.0	37.0	242.4	+16.4	236.3	+ 8.7
17	10 59 14	4		320.5	46.5	337.0	55.0	223.9	+12.3	210.7	+16.7
18	11 30 24	4		292.0	22.5	298.0	18.5	259.2	+ 4.0	257.0	— 1.7
19	11 31 27	2		276.0	40.5	269.3	38.0	257.9	+26.5	264.0	+28.6
20	12 6 59	5		266.0	40.0	265.0	37.5	278.1	+31.8	280.9	+30.7
21	19 34	2.3		290.5	48.5	306.0	47.0	260.7	+25.1	252.8	+17.5
22	22 29	4.5		92.0	30.5	84.0	24.5	147.5	+24.0	148.7	+14.8
23	24 9	3*		149.0	72.0	134.0	45.5	197.3	+64.0	138.3	+59.2
24	39 51	3		211.5	42.0	211.0	34.0	316.7	+67.0	336.4	+62.4
25	49 4	2		184.0	62.5	188.0	57.5 (:)	233.3	+77.3	253.2	+81.1
26	49 59	3		203.5	43.5 (:)	187.0	42.5 (:)	328.7	+72.9	12.4	+81.3
27	52 57	1		250.5	16.0	265.0	10.5 (:)	320.0	+24.7	312.5	+11.3
28	54 49	2		315.0	41.5	304.5	40.0	258.8	+ 9.5	266.4	+12.2
29	12 55 19	5		309.0	36.5	312.0	31.5	265.4	+ 7.4	265.6	+ 1.8
30	13 0 49	1.2*		262.0	48.0	261.0	74.5	286.1	+38.9	251.9	+49.9
31	2 59	5		260.0	50.0	256.0	44.5	285.5	+41.2	293.5	+40.4
32	10 39	2		269.0	30.0	263.0	27.0	300.5	+24.1	306.9	+24.8
33	14 4	2		37.0	21.5	40.5	17.0	196.1	—11.4	191.3	—14.2
34	16 4	3		222.0	34.0	222.5	30.5	332.9	+55.5	336.9	+53.0
35	20 19	2		224.5	28.5	227.0	22.0	338.2	+50.2	342.2	+44.1
36	24 34	4.5		185.0	46.0	182.0	40.0	13.9	+85.1	45.4	+79.9
37	28 54	3		136.0	68.5	154.5	65.0	202.3	+61.8	203.0	+69.9
38	30 19	6		79.0	69.0	51.5	76.0	206.8	+42.0	220.8	+40.2
39	37 51	3		223.5	33.5	216.0	27.5	337.6	+54.2	352.9	+54.6
40	40 1	3		235.5	67.5	215.0	60.0	273.9	+57.8	287.1	+67.4
41	42 52	3		246.0	30.0	241.0	28.0	324.6	+37.6	330.2	+39.5
42	52 14	1*		137.0	51.5	132.5	44.5	171.0	+63.2	162.4	+59.1
43	53 49	2*		127.5	76.0	59.0	69.5	220.4	+56.8	219.0	+36.8
44	56 14	2		286.0	32.5	291.0	25.5	298.8	+15.2	299.7	+ 6.9
45	13 59 19	3		201.0	49.5	199.5	41.0 (:)	326.9	+76.5	359.5	+73.8
46	14 2 44	2		305.0	45.0	301.5	32.0	280.4	+16.3	289.9	+ 6.9
47	10 14	3		58.0	76.0	39.0	70.5	229.2	+41.2	230.4	+33.7
48	12 34	3.4		150.0	75.0	149.5	70.0	228.7	+62.1	221.2	+65.4
49	14 34	2		274.0	62.5	268.0	56.5	283.8	+41.1	292.7	+40.5
50	20 49	2		214.0	30.0	211.5	24.5	3.2	+57.7	12.4	+54.8
51	24 34	3		213.0	35.0	219.0	30.5	358.2	+61.9	357.6	+55.1
52	34 9	2*		100.0	66.5	68.0	79.5	214.8	+48.2	237.2	+45.1
53	14 38 34	2		51.0	78.5	39.0	61.5	240.3	+41.9	232.8	+25.6

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.

Nr. 1 schönes, grosses Meteor von weisser Farbe. Dauer $2\frac{1}{4}^s$
» 2 gelb; sehr hell.
» 6 Dauer $1\frac{1}{3}^s$
» 7 Dauer 2^s
» 8 roth; Nr. 10 gelb.
» 13 nach unten gekrümmt.
» 14 roth. Dauer 1^s
» 30 Dauer 1^s
» 40 endete bei β Draconis.
» 43 Daner $1\frac{1}{3}^s$
» 44 nach rechts gekrümmt.
» 52 Dauer 2^s

1870. April 22. Kremsmünster.

Beobachter: Prof. Strasser.

	h m s			°	°	°	°	°	°	°	°
1	9 56	5		.	.	.	.	110.3	+59.6	116.8	+70.5
2	10 23	2		.	.	.	.	130.8	+48.5	132.7	+56.1
3	26	3		.	.	.	.	219.7	+53.0	224.6	+64.8
4	31	1		.	.	.	.	129.7	+44.9	126.2	+30.8
5	10 33	3		.	.	.	.	232.3	+72.7	128.6	+57.5

1870. April 22. Krakau.

Director Karlinski.

1	10 44.0	2.3		.	.	.	.	114	+ 25	116	+ 13
2	11 21.3	2		.	.	.	.	187	+ 25	168	+ 34

Während der ganzen zweistündigen Beobachtnngszeit von 10^h 15^m bis 12^h 15^m kein anderes Meteor gesehen.

1870. April 23. Wien.

Beobachter: A. v. Littrow und Sauter.

1	9 32 46	5	Sa	34.5	45.5	50.5	39.5	151.0	+ 8.4	137.6	+ 8.5
2	42 32	2	L	286.5	19.5	296.5	13.5	242.2	+ 4.0	238.5	− 6.6
3	43 21	5	L	276.5	30.0	264.5	27.5	242.3	+17.9	252.0	+23.7
4	43 23	3	L	282.5	48.5	263.5	49.0	224 4	+27.6	233.0	+37.8
5	9 44 57	6	L	270.5	66.5	243.5	64.5	210.9	+43.0	217.9	+53.2

Nr	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
6	9 49 23	3	L	261.0	62.0	225.0	54.5 (!)	220.0	+45.0	239 1	+61.7
7	51 59	3.4	Sa	80.5	22.5	90.5	12.5	111.7	+10 5	97.7	+ 9.7
8	54 13	5	L	290.5	21.5	299.5	18.0	241.0	+ 3.2	236.4	− 4.6
9	54 15	4	L	289.5	31.5	299.5	28.0	233.5	+11.5	230.6	+ 3.5
10	55 1	3	L	197.5	39.0	295.5	31.0	225.5	+12.7	231.7	+ 7.8
11	56 48	6	L	241.5	67.5	289.5	82.0	216.0	+54.1	191.6	+45.1
12	9 59 9	2	Sa	80.5	39.5	90.5	28.5	125.8	+22.9	111.1	+21.1
13	10 5 22	4	Sa	49.5	72.5	55.5	58.5	166.7	+35.5	154.3	+26 0
14	5 24	4	L	292.5	75.5	351.5	71.5 (:)	201.0	+41.1	186.2	+29.9
15	10 20	2	L	206.5	42.0	188.5	29.0	282.9	+70.4	342.4	+69.7
16	16 28	4	L	185.0	23.5	279.5	21.5 (!)	249.3	+ 8.0	254.5	+ 9.8
17	25 20	1*	Sa	65.5	56.5	45.5	44.5	153.3	+28.0	156.8	+10.9
18	38 34	4	L	231.0	52.0	242.0	51.5 (!)	255.1	+57.8	252.5	+51.0
19	41 12	2	L	197.0	67.0	168.5	54.5	210.9	+69.3	175.3	+72.6
20	46 42	5	L	87.5	57.5	74.5	56.5	150.6	+37.8	154.7	+31.5
21	48 45	3	Sa	143.5	38.5	130.5	24.5	97.3	+62.0	90.5	+44.7
22	49 13	3	L	70.5	52.5	73.5	45.0	153.8	+27.1	146.5	+23.2
23	10 54 9	3	L	205.5	20.5	212.5	16.0	329 9	+55.6	324.4	+48.2
24	11 9 20	4	L	141.5	74.5	190.5	79.5	180.2	+59.1	202.8	+58.5
25	18 16	5	L	146.5	71.5	274.5	72.5	229.7	+52.3	226.0	+44.0
26	18 18	5	L	315.5	86.5	6.5	85.5 (:)	204.8	+45.7	200 6	+43.7
27	33 7	2	Sa	151.5	48.5	167.5	31.5	126.6	+71.2	51.1	+70.8
28	33 38	4	L	238.5	75.5	256.5	73.5 (:)	226.4	+54.0	230.3	+49.4
29	34 3	5	L	.	.	.		.	.	.	.
30	34 44	5	Sa	233.5	35.5	251.5	28.5	293.1	+49.1	287.9	+32.8
31	39 0	2	L	162.0	77.5	140.5	64.5	198 9	+59.9	168.8	+63.4
32	40 26	3	W	117.5	77.5	104.5	70.5	188.5	+52.7	177.2	+49.4
33	49 30	6	L	239.5	56.0	229.5	56.0 (!)	263.8	+53.8	265.5	+59.4
34	53 42	1*	L	214.0	33.5	214.5	25 0	317.7	+60.8	328.3	+54.4
35	11 56 33	2	L	173.5	58.5	177.5	53.0	192.8	+79.0	193.4	+84.9
36	12 0 56	2	L	197.5	52.0	208.5	44.0	276.8	+78.2	303 4	+69.9
37	4 41	2	Sa	104.5	53.5	115.5	48.5	159.3	+44 4	148.5	+48.4
38	7 10	4	Sa	60.5	44.5	68.5	31.5	173.2	+16.8	159.8	+10.5
39	9 52	4	L	180.5	31.0	168.0	31 0	32.7	+72 8	66.5	+70.5
40	10 4	2	Sa	65.5	52.5	84 5	38.5	176.6	+25.1	155.5	+24.5
41	17 31	3	Sa	84.5	21.5	72.5	16.5	144.8	+12.3	150.1	+ 1.1
42	23 38	3	L	171.5	31.5	159.0	27 5	61.8	+72.1	83.5	+63.7
43	25 10	2	L	101.0	76.0	107.5	70.5 (!)	196.9	+49.0	188.1	+50.3
44	29 2	4	Sa	250.5	51.5	233.5	43.5	277.1	+46.3	295.9	+53.2
45	12 33 52	3	L	207.5	38.5	213 5	36 0 (!)	326.2	+68.0	324.2	+62 6

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
46	12 39 5	3.4	L	255.5	48.5	238.5	47.5	281.3	+42.0	290.0	+51.7
47	42 41	2.3	L	186.5	47.5	161.5	42.5	319.2	+85.6	115.7	+73.9
48	44 4	5	Sa	178.5	46.5	197.5	38.5	75.9	+87.9	343.4	+74.0
49	51 46	2	L	297.5	45.5	314.5	34.5	265.8	+18.4	260.9	+ 2.2
50	12 58 55	5	L	32.0	54.0	27.0	52.5	207.6	+15.7	210.1	+13.3
51	13 2 4	2	L	22.5	62.0	41.0	70.5	216.2	+21.7	219.1	+32.4
52	4 22	5	L	30.5	58.0	18.5	57.5	211.4	+19.2	217.6	+16.8
53	11 50	5	Sa	204.5	63.5	210.5	51.5	262.0	+69.7	298.7	+70.3
54	16 26	3	L	146.5	30.5	162.5	24.5	118.3	+59.0	87.4	+62.6
55	19 3	2	L	174.5	68.5	183.5	58.5(!)	225.8	+69.5	141.7	+79.5
56	23 58	2.3*	Sa	332.5	40.5	310.5	36.5	250.2	+11.5	270.7	+ 5.6
57	44 48	3	Sa	147.0	63.0	126.5	60.5(!)	199.4	+66.7	190.4	+57.5
58	46 12	4	L	114.5	40.5	118.5	32.5	164.4	+44.0	152.9	+42.0
59	46 49	4	L	117.5	43.5	129.5	44.5	166.6	+47.5	161.8	+55.6
60	47 7	4	L	133.5	67.0	136.5	59.5	204.1	+59.9	189.2	+62.6
61	13 49 56	4	L	67.5	76.0	52.5	70.5	221.9	+41.4	220.6	+34.6
62	14 1 10	4	L	134.5	50.5	123.5	44.5	174.0	+60.8	168.4	+51.7
63	2 44	4	L	140.5	39.5	131.5	34.5	150.[illegible]	+60.6	149.7	+51.8
64	6 39	1.2	L	151.5	60.0	.	.	199.8	+69.8	.	.
65	13 45	2	L	239.5	20.5	243.5	17.5	343.9	+35.3	343.1	+30.6
66	13 51	3	L.Sa	226.7	40.0	215.0	24.0	331.6	+56.0	3.9	+53.3
67	19 59	4.5	Sa	188.5	17.5	208.5	13.5	51.2	+58.5	22.9	+48.0
68	20 58	1*	L	59.5	32.5	67.5	27.0	200.0	+ 6.6	191.2	+ 6.3
69	21 31	1.2	Sa	46.5	23.5	57.5	19.5	105.2	— 7.1	194.2	— 5.0
70	21 56	2	L	70.5	37.5	74.0	21.5(:)	196.2	+16.1	183.3	+ 5.8
71	22 5	3	L	320.5	59.5	355.5	50.5(:)	267.8	+22.5	250.3	+ 8.8
72	22 45	4	Sa	66.5	50.5	51.5	47.5	207.9	+24.0	214.3	+15.6
73	28 15	3	L	115.5	57.5	136.5	58.0	197.6	+51.5	196.2	+62.7
74	28 16	4	L	163.5	70.5	153.5	61.5	235.2	+66.4	210.4	+69.9
75	14 34 0	4.5	L	222.5	62.5	218.5	47.5	293.1	+62.9	327.4	+64.4

Nr. 7 sehr langsam.
„ 23 zweifelhaft ob Meteor.
„ 24 sehr schnell.
„ 29 kurzes Meteor, ganz im Zenithe.
„ 60 A. v. Littrow vermuthet um 13^h 49^m das Vorhandensein eines Radianten bei Az = 100° H = 89° (α = 225° δ = + 49°), dem unter anderen die Meteore Nr. 58, 60 und 61 angehören; ferner eines zweiten, nördlicheren, den kurz darauf das stationäre Meteor Nr. 64 bestätigte. Dem letzteren gehören noch an die Meteore Nr. 62 und 63.
„ 65 gleichzeitig eine zweite Sternschnuppe, die wie eine Fortsetzung der früheren aussah, daher wohl nur ein intermittirendes Meteor.

Die Beobachtungen um 9^h 10^m begonnen und bis 14^h 35^m fortgesetzt. Der Leierradiant schien nur noch schwach vertreten zu sein.

1870. April 23. Troppau.

Beobachter: Palisa und Merklas.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
1	9 8 32	2		229.0	72.5	163.0	82.5	196.4	+59.0	166.6	+57.0
2	13 7	2		329.0	44.0	315.0	35.0	193.7	+ 7.7	207.3	+ 4.0
3	16 17	3.4		230.0	22.5	123.0	20.0	278.8	+42.5	288.8	+44.8
4	18 17	2*		239.0	54.0	216.0	50.5	233.0	+54.5	247.5	+67.3
5	23 38	6.7		243.0	40.5	231.0	37.0	251.5	+46.0	264.0	+51.7
6	25 7	2.3*		156.0	43.5	153.0	38.0	72.2	+73.2	62.8	+67.5
7	38 12	6.7		262.0	75.5	258.0	70.5	200.4	+49.8	208.3	+50.0
8	9 41 22	2.3		175.0	24.0(:)	178.0	19.0(!)	9.1	+63.8	2.6	+59.0
9	10 0 12	2*		271.0	44.0	246.0	44.0	241.1	+31.5	254.7	+46.0
10	4 35	4		243.0	55.5	225.0	52.5	241.0	+52.8	251.6	+61.3
11	25 32	6		300.5	58.5	282.0	60.5	220.8	+28.8	226.8	+36.9
12	41 7	3.4		28.5	35.5	37.0	32.0	170.8	− 0.9	162.9	− 1.8
13	44 37	2		197.0	69.0	180.0	53.0	211.7	+69.2	194.6	+86.9
14	10 59 37	5		154.0	64.5	184.0	65.0	169.6	+70.0	204.0	+74.8
15	11 13 57	2.3		268.0	42.5	.	.	262.4	+32.3	.	.
16	33 2	2		56.0	19.5	57.5	17.5	154.9	− 4.7	152.6	− 5.6
17	38 0	1*		218.5	30.0	211.5	26.5	317.7	+55.0	330.5	+56.4
18	43 5	6		193.5	46.5	200.0	59.5	314.5	+80.5	250.6	+75.1
19	11 53 37	1*		23.0	60.5	24.0	53.5	200.0	+21.9	197.4	+15.4
20	12 3 42	4.5		263.0	46.0	.	.	273.4	+37.3	.	.
21	9 42	3.4		75.0	15.5	66.5	26.5	160.2	+17.9	160.3	+ 6.4
22	16 55	2.3		238.0	54.5	207.5	43.0	277.3	+55.1	317.4	+70.0
23	19 30	6		43.0	17.0	23.5	20.0	176.4	−13.1	195.3	−17.0
24	20 22	6		204.0	61.0	201.0	57.5	259.6	+72.6	269.3	+75.6
25	24 2	3.4		288.0	30.5	280.0	26.0	276.6	+12.6	285.0	+13.7
26	27 40	2.3		124.0	59.5	130.0	51.5	169.2	+57.3	153.0	+59.0
27	30 42	3		92.0	46.5	92.5	34.0	164.3	+34.8	153.1	+26.8
28	37 9	3		265.0	18.0	258.5	14.5	304.6	+17.0	311.9	+18.4
29	55 52	3		257.5	53.5	263.0	45.5	281.6	+44.4	288.0	+37.0
30	12 55 52	3		254.0	58.5( )	248.0	52.5	276.3	+48.2	286.7	+48.9
31	13 4 37	4		303.0	51.5	306.0	48.5	264.0	+22.3	264.2	+18.7
32	7 7	2		264.5	50.5	252.0	44.5	285.4	+38.9	298.1	+42.9
33	7 7	1.2*		291.0	55.5	263.5	56.6	268.2	+29.9	279.4	+42.4
34	15 22	2		312.0	42.0	296.5	37.5	266.7	+11.1	279.3	+13.7
35	13 27 42	4.5		267.0	51.0	275.5	42.0	288.5	+38.1	292.2	+27.8

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
36	13 31 17	2		237.0	63.0	207.0	55.5	281.0	+57.3	299.1	+73.0
37	41 2	3		131.0	28.5	141.0	23.5	137.4	+47.4	126.0	+49.8
38	43 5	2		270.5	64.0	254.0	69.0	276.2	+43.3	272.5	+51.1
39	43 52	2		152.5	53.0	162.0	42.0	167.3	+72.9	123.0	+75.3
40	47 42	1.2		59.0	61.5	39.0	48.0	212.1	+30.9	214.8	+13.5
41	13 55 17	3.4		257.0	46.5	250.5	43.0	304.9	+41.0	312.2	+42.8
42	14 5 52	5		272.5	49.0	265.0	42.5	297.2	+34.0	307.3	+34.0
43	8 2	5		227.0	44.0	211.0	37.5	327.5	+58.0	356.5	+64.7
44	12 52	2.3		117.5	32.0	123.5	31.0	160.0	+41.1	154.3	+44.4
45	13 39	2.3		308.0	33.5	322.0	28.0	288.3	+ 5.3	280.3	— 5.1
46	15 27	5		279.5	21.5	272.5	19.5	316.3	+10.4	322.7	+13.2
47	19 0	3		283.0	23.5(:)	278.0	48.5(!)	313.4	+10.0	320.8	+ 9.1
48	20 12	3		225.5	33.5	217.0	30.0	347.4	+53.0	0.4	+55.9
49	24 55	2		303.5	50.0	322.5	47.5	284.8	+20.9	274.7	+12.7
50	24 55	2		344.0	45.0	330.0	42.5	261.1	+ 5.4	271.5	+ 6.1
51	31 25	5		346.0	50.0	332.0	49.5	260.7	+10.7	269.6	+12.2
52	32 35	5.6		116.5	61.5	116.0	55.5	205.1	+54.0	195.6	+52.2
53	35 0	1.2*		321.0	50.5	322.5	61.5	277.1	+15.8	271.1	+25.3
54	39 32	3		329.5	51.5	315.0	61.5	272.5	+14.6	275.8	+27.1
55	44 57	5		74.5	42.5	169.5	46.5	101.3	+81.7	140.7	+82.1
56	47 7	4		320.0	35.0	313.5	31.5	287.2	+ 2.0	293.6	+ 1.3
57	14 49 41	1.2		171.5	57.0	144.0	54.0	226.3	+81.3	190.5	+67.9
58	15 1 30	3		288.0	58.5	260.0	57.5	295.4	+33.3	307.2	+44.8
59	4 40	2		231.0	31.0	225.0	25.5	356.7	+48.0	8.0	+47.7
60	15 7 17	3		175.5	43.0	167.5	39.5	103.8	+82.4	124.3	+76.3

Nr. 9 Dauer 2ˢ.
» 12, 27, 40 und 49 roth.
» 15 und 20 stationäre Meteore,
» 17, 19, 33, 50 und 57 gelb,
» 33 langsam.
» 39 Dauer 1ˢ.
» 43, 54, 59 sehr schnell.
» 53, 57, schnell.

1870. April 23. Krakau.

Director Karlinski.

Nr.	Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	11 14.0	3		.	.	.	.	163	+44	155	+32
2	42.0	3		.	.	.	.	154	+36	146	+27.5
3	11 53.5	2		.	.	.	.	155	+10	148	+ 2

Ausser den obigen drei, welche eine goldgelbe Farbe hatten, zwischen 11^h 15^m und 13^h 15^m keine weiteren Meteore bemerkt.

1870. Mai 18. Wien.

Beobachter: Palisa und Sauter.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
1	10 22 40	2	P	311	46	299.5	44.5	244.6	+13 5	252.4	+16.8
2	43 30	1.2	S	155	21	152.0	14	82.4	+56.3	80.9	+48.7
3	10 44 40	3.4	S	191	20	187.5	17	16.4	+60.5	24.0	+58.2

N. 1 langsam, weiss.
» 2 sehr langsam.

1870. Mai 19. Wien.

Beobachter: Palisa, Schulhof und Sauter.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	9 36 18	2	Sch	235	66	203	44	238.9	+56.8	297.7	+73.6
2	9 58 48	4	Sch	171	51	158	36 (:)	146.0	+83.5	88.1	+69.8
3	10 4 34	3	Sch	267.5	51.5	234	27 5	259.7	+37.0	304.9	+43.8
4	20 8	♀*	P	262.5	54 (!)	262	67.5 (!)	262.7	+40.8	245.6	+46.3
5	34 33	5	P	297.5	43.5	288.5	33.5	258.2	+16.8	270.5	+13.5
6	40 0	2	P	335.5	69 (!)	340	63 (!)	227.1	+28.6	226.0	+22.4
7	45 23	1.2	Sch	234	51.5	214	32.5 (:)	282.4	+55.8	327.7	+60.1
8	52 54	2	P	321.5	61	37.5	72	239.8	+23.5	207.5	+33.1
9	10 52 54	3	Sch	245.5	65	231.5	59.5	259.6	+52.3	270 0	+58.5
10	11 15 58	3.4	Sch	232	65	194	74 (:)	265.4	+58.1	234.9	+63.5
11	33 57	6	P	309	51.5	300	47.5	261.6	+18.7	269.0	+18.9
12	11 47 39	2	Sch	11.5	49.5	3	48	226.7	+ 8.2	232.1	+ 6.2
13	12 2 13	3.4	Sch	39.5	52	46.5	47.5	213.9	+15.7	207.6	+13.8

Nr. 1 Dauer 2^s.
» 3 stark gekrümmte Bahn: Meteor in der Mitte heller. Dauer 2^s.
» 4 schönes rothgelbes Meteor.
» 7 gegen Ende stärker werdend. Bahn schwach gekrümmt.

1870. Mai 28. Wien.

Beobachter: Palisa, Schulhof und Sauter.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	9 39 21	3	Sch	262.5	57.5	248.5	53.5 (:)	257.2	+42.5	267.0	+48.1
2	9 39 43	3.4	Sch	313.5	62.5 (!)	5.5	58.5	233.2	+26.7	208.2	+16.8
3	10 0 42	3*	Sch.P	252.5	67.5	272.5	66.5	250.9	+49.9	249.0	+42.2

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
4	10 4 47	6	P	134.5	65.5	113.0	63.5	254.6	+60.6	176.0	+51.5
5	6 49	2	P	174.5	26.5	172.0	16.0	51.1	+67.9	52.2	+57 1
6	9 17	4.5	P	260.5	75.5	118.5	82.5	240.4	+48.5	207.9	+51.3
7	14 52	3.4	S.Sch	292.0	68.0	314.5	58.0	245.6	+36.7	244.0	+22.6
8	19 8	4.5	P	170.5	55.5	166.0	50.0	185.8	+80.6	147.3	+80.7
9	22 3	3.4	P	156.5	48.0	122.5	53.0	139.8	+74.3	161.6	+54.2
10	10 29 17	3.4	S	329.5	62.0	345.5	49.5	238.5	+22.9	233.0	+ 8.5
11	11 53 51	1*	Sch	23.5	27.5	19.0	16.0	223.5	—11.3	224.7	—23.6

Nr. 1 gekrümmte Bahn.
» 5 durch Nebel gesehen, daher Grösse wohl unterschätzt.
» 6 und 9 schnell.
» 11 sehr schönes, langsam dahinziehendes röthliches Meteor. Dauer 3ˢ.

1870. Juni 8. Wien.

Beobachter: Assistent Palisa.

Nr.	Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	10 24	1.2		281	50	195	31	279.4	+29.3	14.0	+69.4

Sehr langsam einherziehendes Meteor. Dauer 5ˢ—6ˢ

1870. Juli 3. Wien.

Beobachter: Assist nt Palisa.

Nr.	Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	11 28 14	6		319.5	56.5	330	67	296.2	+20.0	286.6	+27.5
2	37 29	2		328	52 (!)	330.5	55.5 (!)	295.7	+13.8	293.0	+16.6
3	54 42	4		308	33.5	323	24 5	321.6	+ 4.0	314.3	—10.1
4	11 57 47	5		350	58.5	26	49	286 7	+17.0	264 2	+ 9.8
5	12 4 10	7		323	49.5	313	46.5	306.4	+12.7	313.9	+13.2
6	12 5 44	3.4		267	45	268	44	341.1	+33.5	341.5	+32.3

1870. Juli 4. Wien.

Beobachter: Assistent Palisa.

Nr.	Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	11 16 47	3 4		229	53 (!)	216.5	52 (!)	334.3	+59.2	338.8	+66.3
2	18 23	5		180	37.5	170	27.5	92.3	+79 3	116.5	+67.9
3	11 45 49	4.5		282	70 (!)	259	62	305.4	+40.8	320.7	+45.9

Die Beobachtung wegen Bewölkung des Himmels geschlossen.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.

1870. Juli 5. Wien.

Beobachter: Assistent Palisa.

Nr.	Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
1	11 28 7	2		294	59 (!)	315	50 (!)	308.7	+30.0	304.0	+15.6
2	33 12	3		269	52.5	265	50.5	326.5	+36.8	330.3	+37.8
3	51 0	6		290	50.5	293	41	323.0	+25.5	328.1	+17.0
4	52 55	6		235.5	48 (!)	231	40.5	350.9	+53.8	4.7	+53.5
5	55 35	2		241	65.5	204	53.5	321.1	+54.3	344.3	+74.0
6	11 57 5	3		194	56.5	173	49.5	323.5	+78.1	211.1	+85.2
7	12 22 55	5		317	37.5	308	30.5	322.3	+ 3.9	332.4	+ 1.5
8	40 33	5		219	44.5	202	55	17.1	+63.2	349.1	+74.8
9	49 1	4		194	30.5	168	39.5	79.9	+69.4	165.1	+77.7
10	50 26	4		297	73.5	304	77.5	315.4	+38.9	310.0	+40.3
11	52 58	6		263	36.5	250	30.5	5.0	+30.6	18.6	+35.1
12	53 5	3.4		281	47.5	262	44.5	345.5	+27.6	357.9	+36.1
13	12 58 31	3.4		233	54.5	216	48.5	357.1	+57.1	14.1	+66.3
14	13 25 35	☾*		64	7	54	4	239.7	−11.5	246.1	−19.8
15	29 5	6		86	60.5	82	47	267.0	+38.7	255.6	+28.9
16	36 16	2.3		7	43 (!)	1.5	51	302.6	+ 1.4	306.8	+ 9.2
17	37 42	3		329.5	52	343	33.5	326.9	+13.5	322.5	− 6.9
18	13 44 41	3.4		350	31.5	352	28	318.6	− 9.8	317.2	−13.5
19	14 6 58	4		8	49	14	44	310.2	+ 7.5	305.4	+ 3.0
20	14 8 38	3		335	23	343	23	339.8	−15.4	332.3	−17.2

Nr. 1 gelb. Dauer sehr kurz, etwa $0^{s}1$.
» 5 weiss. Dauer $0^{s}3$.
» 9 nebelartig.
» 14 Feuerkugel ersten Ranges, die den ganzen Südhimmel wie eine bengalische Flamme beleuchtete. An Form ähnelte das Meteor einem Weberschiffchen und hatte in der Längsachse eine Ausdehnung von 15', Farbe glänzend weiss; Dauer der Erscheinung 3^{s} mit Hinterlassung eines rasch vergänglichen Schweifes.
» 18 schnelles Meteor.

1870. Juli 6. Wien

Beobachter: Assistent Palisa.

Nr.	Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	12 17 24	2.3		2.5	31 (!)	4.5	20.5	286.9	−10.8	284.6	−21.2
2	20 47	3.4		42.5	56.5	57.5	54.5	266.5	+20.6	257.6	+23.5
3	21 59	♀*		56.5	67.5	35	69.5	267.7	+33.2	276.7	+30.5
4	25 44	1*		143.5	55	167.5	37	231.9	+66.7	155.0	+75.5
5	12 29 1	6		83	52.5	88.5	45	246.0	+32.8	236.5	+31.0

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
6	12 29 31	3		58.5	34	65	29	246.7	+ 7.4	239.3	+ 6.6
7	32 37	3		49.5	49.5	66.5	45	261.8	+16.6	249.3	+19.9
8	38 13	6.7		13.5	78 (!)	52.5	76	290.8	+36.4	280.1	+38.6
9	39 50	3		39.5	74 (!)	58.5	64.5	282.3	+35.1	269.2	+31.6
10	42 6	2		139.5	68	165	55.5	264.3	+61.7	249.2	+78.2
11	47 8	4		104.5	54.5	118.5	46	244.2	+44.7	227.3	+49.2
12	47 39	6		104.5	50	98.5	49	238.9	+42.8	240.2	+38.4
13	53 26	2*		51.5	63.5	62	42.5	274.6	+28.7	255.5	+15.8
14	12 57 8	3		304.5	39	315.5	36	339.6	+10.1	333.6	+ 3.1
15	13 2 0	3		103.5	38.5	113.5	35	230.4	+35.9	220.8	+40.2
16	3 34	2		80.5	50	81.5	46.5	253.6	+30.0	250.1	+28.3
17	22 45	1		261.5	20 (!)	251.5	16.5 (!)	27.7	+20.3	37.8	+24.5
18	31 50	2		267	37	252.5	28.5	12.8	+28.5	29.5	+32.1
19	38 56	♃		338.5	33	331.5	17.5	327.6	— 6.5	338.3	—19.5
20	40 44	5		329.5	39	343.5	36	333.1	+ 1.4	323.2	— 4.5
21	42 4	2.3		267	64.5	265.5	76	346.6	+43.5	331.1	+47.4
22	13 58 36	3		143.5	23.5	149.5	20	196.9	+52.0	186.3	+52.6

Nr. 3 sehr schönes gelbes Meteor, das 2ˢ dauerte.
» 4 weiss; Dauer 1ˢ.
» 7 roth.
» 9, 10, 12 und 18 weiss. Dauer des letzteren Meteores 1ˢ.
» 17 Dauer 1ˢ.
» 19 schönes rothes Meteor, das durch Wolken noch mit der Helligkeit Jupiters durchleuchtete. Dauer 1ˢ5.
» 20 sehr schnell.
» 21 schnell, gelb.

1870 Juli 7. Wien.

Beobachter: Assistent Palisa.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	12 6 58	6		172	51	184	49	228.8	+84 1	359.5	+87.2
2	16 46	6.7		272	61	271	55.5	328.9	+39.8	335.4	+37.5
3	16 59	3		260	25 (:)	259	20 (:)	9.4	+24.8	14.0	+22.0
4	21 57	4		282	42.5	275.5	52	343.1	+23.6	338.3	+33.2
5	25 16	3		262.5	32 (!)	259.5	23	4.1	+28.0	13.5	+23.7
6	44 37	5		299	48.5	324	40.5	335.1	+20.1	323.5	+ 4.3
7	12 55 29	6		253	56	251	53	350.8	+46.7	355.5	+46.6
8	13 0 45	6		253.5	46.5	271	53	3.8	+42.1	349.0	+36.1
9	6 25	1*		319	67	286	58	319.4	+29.4	339.4	+32.4
10	13 11 50	6.7		247	32	245	15.5	25.9	+38.1	41.9	+28.1

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
11	13 32 20	1*		94	36.5	82	32	242.7	+28.7	246.5	+18.4
12	42 6	3*		96	72	153.5	51	284.5	+46.9	240.4	+72.7
13	44 26	6		99	45.5	83.5	48.5	251.5	+37.2	262.0	+30.6
14	47 7	6.7		120	50.5	114	45.5	249.3	+51.9	244.8	+46.1
15	48 39	3.4		104	33.5	104	26.5	237.9	+33.1	231.8	+28.5
16	13 53 33	7		45	58	54	48	290.2	+22.5	279.6	+16.9

Nr. 9 gelbroth; Dauer 1ˢ
» 11 weiss; Dauer ½ˢ
» 12 Dauer 1ˢ5.
» 15 weiss.

1870. Juli 23. Wien.

Beobachter: Assistent Palisa.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	10 4 19	4*		247.5	52.5	261.5	42.5	330.3	+48.3	335.6	+35.2
2	10 41 59	4		0	32.5	320.5	21.5	281.9	— 9.3	319.1	—11.8
3	12 7 6	3		342	78 (!)	332	72.5	307.9	+36.7	312.9	+32.3
4	9 23	4		168	59	159	48.5	274.8	+77.1	222.7	+76.0
5	10 36	4		337.5	30	339	23	323.7	— 9.2	324.3	+16.4
6	12 44	2		53.5	70.5	67	56	285.7	+34.8	268.9	+28.2
7	16 36	5		211	33.5	221	30.5	56.6	+62.6	50.1	+54.3
8	21 6	1.2		205	72	190	54.5	323.9	+63.6	347.8	+81.1
9	24 13	3.4		20	58.5	25	43	296.7	+18.0	289.4	+ 3.9
10	31 39	3		272	17.5	263	13.5	26.3	+11.6	36.3	+15.5
11	36 28	3.4		204	14	206	10.5	92.3	+50.5	91.9	+46.5
12	41 53	4		235	68.5	261	78.5	344.9	+56.6	329.3	+48.7
13	44 13	3.4		279	54.5	255.5	43.5	355.7	+33.1	17.8	+39.3
14	50 37	4.5		293	39.5	283.5	46	1.8	+15.8	2.5	+25.4
15	51 47	3		318	45.5	322.5	41	342.9	+10.6	341.9	+ 5.2
16	12 54 35	4		327	38.5	328.5	34	340.4	+ 1.5	340.8	— 3.1

Nr. 1 gelb; Dauer 1ˢ
» 6 und 8 gelb
» 7 und 11 nebelartig. Dauer des letzten Meteores 2ˢ
» 13 und 15 Dauer 1ˢ

1870. Juli 26. Wien.

Beobachter: Assistent Schulhof, Assistent Palisa, Holetschek und Borutzky.

Nr.	Mittlere Wiener Zeit h	m	s	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
						°	°	°	°	°	°	°	°
1	9	59	2	3	P	246	31.5	281	22.5	357.5	+38.4	341.0	+ 9.7
2	10	3	5	1.2	P	157	41.5(!)	160	28 (!)	171.2	+72.4	139.8	+64.6
3		7	22	5.6	P	83	50	97.5	46.5	227.9	+31.3	217.6	+36.9
4		9	22	4	.	156	38.5	144	35.5	166.3	+70.2	174.5	+60.7
5		13	12	5	P	116	38	113.5	44.5	199.8	+43.6	208.9	+45.3
6		16	32	4	P	194	29.5(!)	187	49 (!)	63.6	+68.5	356.2	+85.3
7		17	46	2.3	P	235	28.5	243	18.5	13.4	+43.8	16.2	+31.7
8		21	36	4	P	126.5	46.5	119.5	43.5	207.7	+51.4	206.8	+48.7
9		30	3	3	H	225	46.5	217	39.5	357.9	+59.8	16.3	+62.2
10		30	4	3	S	249	53.5	220	43.5	337.8	+47.9	6.5	+62.1
11		30	13	3.4	P	180	59.5	181.5	40.5	281.9	+78.7	92.6	+82.1
12		34	3	1.2	P	188.5	57.5	163	42.5	308.6	+79.4	173.7	+76.9
13		34	32	2	P	136	48.5	139	41.5	210.4	+61.1	195.3	+60.5
14		34	58	2*	S	163	60.5	138	48.5	250.9	+74.3	209.6	+62.4
15		41	18	3.4	S.P	210	49.5	220	45	359.6	+70.4	6.3	+62.7
16		50	19	2.3*	P	162	58	138	55.5	246.1	+75.5	228.7	+63.5
17		59	11	3	P	316	74.5	37	78	302.4	+36.2	280.0	+38.2
18	10	59	59	3	S	283.5	52.5	283	48	332.4	+29.7	336.4	+27.0
19	11	1	4	3.4	H.S	269.5	33.5	289	43.5	356.1	+24.7	336.9	+20.9
20		2	54	3	P	81	38	76	25.5	232.9	+22.1	227.3	+10.1
21		4	35	3	P	61	26.5	73	22.5	238.9	+ 2.5	228.5	+ 6.8
22		7	19	3	S	231.5	45.5	218	24.5	5.9	+55.4	45.9	+51.9
23		8	52	6	P	44	52	59	62.5	265.0	+17.1	264.3	+30.2
24		10	34	2	H	264	42.5	265.5	24.5	353.8	+33.7	8.2	+20.9
25		20	32	2.3	S	280	39.5	271	36.5	350.0	+22.7	357.7	+25.7
26		21	2	5	P	125	59.5	129	59.5	245.2	+56.7	245.0	+58.8
27		26	16	3	P	341	31.5	350	30.5	312.2	− 8.4	304.7	−10.8
28		31	47	2	P	151	51.0	142	49.5	226.8	+71.2	224.4	+65.2
29		35	2	4	P	119	35.5	113.5	31	215.7	+44.1	214.7	+37.8
30		37	26	4	P	168	29.5	162	19.5	149.4	+69.1	151.9	+57.8
31		37	52	3	H	342	38.5	350	36.5	312.9	− 1.8	307.0	− 4.8
32		44	47	3	S	165	55.5	151	48.5	254.5	+78.2	222.4	+70.9
33		47	15	1*	S	173	60.5	178	45.5	285.7	+77.0	149.4	+86.9
34		48	2	4	H	252	54.5	273	46.5	354.9	+46.6	354.8	+31.1
35	11	50	14	4	H	6	24.5	22	18.5	296.1	−17.1	279.5	−20.4

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
36	11 52 47	5	B	319	47.5	305	53.5	329.6	+12.1	334.3	+21.8
37	53 37	4	P	296	75.5	220.5	59.5	320.0	+40.4	351 8	+64 1
38	11 57 57	3	P.S	197.5	48	179.5	46.5	28.3	+78.3	135.7	+88.2
39	12 4 15	3	H	45	35.5	70	33.5	270.3	+ 2.8	252 0	+12.8
40	4 47	3.4	P.S	118	43.5	142.5	37	233.5	+47.7	207.3	+60.5
41	6 50	4	P	217	15.5	204	10.5	70.4	+45.5	90.0	+47.2
42	9 8	4 5	P	179	39	163	29.5	131.6	+80.8	167.8	+67.7
43	14 5	6	P	140	60.5	111	52.5	261.3	+64.2	250.6	+47.5
44	14 20	2.3	P.S	152	62.5	164	61	271.0	+68.9	278.4	+74.3
45	16 30	4	H	255	39.5	258	40.5	18.3	+37.4	15.6	+36.1
46	20 25	3	P	111	35	116	27.5	234.7	+40.4	220.8	+37.1
47	23 30	1.2	P	138	33 5	141	23	210.7	+55.5	194.0	+50.8
48	24 5	3	P	119	80.5	64	69.5	296.8	+52.1	287.4	+36.6
49	24 5	3	S	137.5	38.5	140	30.5	218.8	+58.0	205.0	+55.0
50	27 5	4.5	P	78	66	71	63	280.6	+38.6	279.8	+34.4
51	27 20	2.3	H.S	143	34.5	136	24.5	208.5	+59.4	202.8	+48.1
52	34 55	2.3	P.S	244	78.5	65	72.5	330.2	+52.1	292.7	+38.7
53	34 57	4.5	P.S	210	61.5	172	57.5	353.9	+68.5	288.8	+79.5
54	36 50	5	P	126	41	133	27.5	233.4	+51.7	211.1	+48.4
55	43 4	3*	P.S	81 5	66.5	62	57.5	284.1	+40.1	282.8	+27.5
56	43 39	3.4	P	88	54	78	41.5	268.8	+36.1	262.7	+23.0
57	45 39	4	P	69	38.5	63	26.5	266 3	+16.1	262.9	+ 3.5
58	47 6	3	P H	47	52	65.5	48.0	287.9	+17.9	275.2	+21.7
59	48 28	3.4	P.S	113	68.5	125	53.5	283.1	+52.1	256.4	+55.8
60	53 34	2	H	12	16.5	17	31.5	309.5	+ 5.3	303.1	— 8.9
61	54 4	3	P	187	29.5	185	19 5	119.3	+70.6	128.1	+61.0
62	57 34	4	P	87	31.5	78	28.5	252.9	+21.0	256.7	+13.5
63	59 0	3	P.S	125	28.5	131	19 5	224.6	+43.8	210.7	+41.5
64	12 59 1	4.5	P	125	42.5	135	31 5	241.7	+51.8	219.7	+52.4
65	13 0 24	3	P	124	50	139	46	254 0	+54.2	240.6	+62.3
66	2 14	4*	P	164	54.5	184	45.5	268.2	+78.2	92.8	+86.1
67	5 49	2	H	348	67.5	355	82.5	326 0	+26.1	322.5	+40.8
68	5 49	3	S	80	88.5	95	80.5	318.7	+47.9	306.7	+48.2
69	6 26	3*	B	147	55.5	133	50.5	263.5	+68.6	253.5	+59.8
70	6 54	3	B	162	38.5	172	33.5	201.1	+73.7	166.3	+74.1
71	9 49	2*	B	280	31.5	278	26.5	23.2	+17.0	28.2	+14.5
72	13 29	5	P.S	170.5	63.5	153.5	59	307.4	+73.9	277.5	+71.1
73	14 54	4	P.S	153	43	163	32	227.8	+70.5	187.8	+69.4
74	17 22	4	S	206	76	204	57.5	336 1	+60.3	11.9	+72.9
75	13 29 5	4 5	P	80	58	59.5	43.5	287.3	+34.8	286.4	+15.5

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
76	13 29 38	3.4	P	275	57.5	279	54.5	8.8	+36.6	283.7	+33.1
77	31 3	4.5	P.S	161	29.5	129	24.5	192.1	+66.3	225.2	+43.7
78	31 24	3	H	347	44.5	7	38.5	336.6	+ 3.4	321.8	— 3.1
79	33 2	4	H	304	64.5	306	62.5	352.2	+30.8	352.8	+28.7
80	34 20	2	P.S	128	71	148	58	300 1	+57.0	277.5	+68.7
81	35 8	4	P	7	56.5	17	52.5	324.2	+14.8	317.6	+11.7
82	36 28	2	P	111	69.5	131	54.5	297.0	+51.4	269.1	+59.5
83	36 58	4	S	104	58.5	113	48 5	281.8	+46.1	265.2	+47.0
84	39 12	3*	P	321	61.5	339	60.5	348.5	+24.0	340.2	+20.0
85	43 0	2*	P.S	85	76.5	66.5	66.5	311.0	+45.3	303.7	+35.3
86	43 35	3	P	187	25.5	188	20.5	134.4	+66.7	134.5	+61.6
87	44 13	2	H	311	24.5	314	18.5	14.2	— 5.1	14.7	—11.6
88	44 36	3	P	222	50.5	219	34.5	39.9	+62.9	71.5	+58.1
89	45 37	2	P	174	34.5	169	21	171.2	+75.6	172.8	+61.5
90	46 38	3.4	S	237	42.5	221	31.5	47.5	+50.5	74.4	+55.0
91	47 25	2	B	279	34.5	289	21.5	31.3	+19.7	33.3	+ 4.1
92	48 20	3	P	41	75.5	62	79.5	319.8	+36.6	319.0	+42.5
93	49 0	3	P	153	58	147	43.5	283.3	+71.2	242.5	+66.8
94	49 15	5	S	94	74.5	60	60.5	308.8	+47.0	302.6	+29.0
95	50 23	3.4	P	148	38.5	149	31.5	231.2	+65.0	218.0	+61.3
96	51 33	3	P.S	205	65.5	223	64.5	0.6	+68.4	11.0	+62.0
97	53 26	1*	H	345	45.5	352	33.5	343.5	+ 4.6	339.7	— 8.0
98	55 18	3	S	242	62.5	250	40.5	16.8	+53.6	44.8	+41.2
99	55 31	3.4	P	73.5	61.5	58	60.5	299.7	+34.4	305.1	+28.3
100	56 25	4	S	201	40.5	204	32.5	83.1	+73.2	95.9	+66.1
101	56 29	2	H	246	33.5	245	31.5	55.0	+39.6	57.7	+39.1
102	57 21	5	P	71	38.5	65	29.5	283.1	+17.1	281 2	+ 7.0
103	57 45	2*	H	316	46.5	315	35.5	3.2	+12.2	9.1	+ 2.8
104	58 0	3.4*	P.S	215	82.5	192	77.5	341.4	+54.2	339.2	+60.4
105	13 59 25	2	P	270	79.5	.	.	350.0	+47.1	.	.
106	14 0 55	4	P	115	86.5	76	74.5	329.7	+49.6	314 1	+42.5
107	1 30	2	P.S	139	41 5	151	34.5	247.2	+60.5	223.1	+64.5
108	3 50	3	H	313	48.5	308	44 5	5.7	+14.9	10 8	+13.3
109	4 35	3	H.B	231	26.5	227	20 5	75.6	+45.1	85.0	+43.5
110	4 55	4	P	165	28.5	154	23 5	191.5	+67.1	204.7	+57.9
111	6 59	3	P	173	33.5	167	22.5	178.4	+74.4	182.9	+62.3
112	7 0	3	S	200	48.5	179	43.5	57.5	+76.6	165.2	+85.2
113	12 20	4	S	242	42.5	233	40.5	51.1	+47.2	59.0	+52.1
114	12 55	2*	S	240	46.5	233	34.5	46.9	+50.4	67.1	+48.8
115	14 14 25	2	P	275	33	266	28.5	41.6	+20.9	50.9	+23.3

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
116	14 15 0	4*	P.S	180	72.5	163	51.5	338.3	+65.7	271.3	+78.6
117	17 5	2	P.S	120	71.5	179	38.5	310.7	+54.3	163.5	+80.3
118	17 50	1	P.S	246	35.5	221.5	34	58.3	+40.8	78.3	+56.1
119	20 55	3	B	272	35	264	32	43.5	+24.1	51.0	+27.0
120	22 10	4	B	321	42.5	329.5	39	8.0	+ 7.0	3.3	+ 1.4
121	22 10	4	S	158	53.5	153	36.5	279 2	+75.2	229.5	+67.1
122	24 40	1	P.S.B	193	68.5	145	58.5	353.7	+68.7	290.4	+67.1
123	28 55	2	B	352	33.5	343.5	26	348.5	− 8.0	357.1	−14.3
124	28 55	3	S	197	38.5	193	32.5	103.8	+74.3	126.1	+71.4
125	37 8	2	P	237	41.5	232	33.5	61.5	+50.0	75.1	+48.9
126	14 38 45	2	H	102	16.5	97	10.5	256.7	+20.2	256.2	+12.5

Nr. 2 brillant roth; Dauer 1ˢ.
» 5 und 9 langsame, Nr. 38 und 53 sehr schnelle Meteore.
» 6 sehr schönes Meteor; Farbe weiss. Dauer $\frac{1}{2}$ˢ
» 12 Dauer 1ˢ; Nr. 46 Dauer $\frac{1}{2}$ˢ; Nr. 66, 118 und 122 Dauer $1\frac{1}{2}$ˢ.
» 14 röthlich; Schweifspuren lange sichtbar.
» 18 und 72 stark, Nr. 96 schwach gekrümmt.
» 40 Ein Doppelmeteor; beide Componenten flogen in geringer Entfernung hintereinander her.
» 91 sehr langsam. Dauer über 1ˢ
» 97 schnelles Meteor.
» 105 fast ganz stationäres Meteor.

1870. Juli 26 Kremsmünster.

Beobachter: Prof. Dr. Strasser.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	10 16 1	.		118.1	33.0	121.6	22.7	192.1	+42.3	179.1	+36.7
2	22 10	3		145.8	38.0	167.0	4.6	178.2	+63 3	116.2	+45.0
3	27 33	3		136.1	36.3	127.6	33.5	185.0	+55.9	188.9	+48.5
4	33 54	2		115 9	38.9	125.1	33.9	203.8	+44.1	191.6	+47.2
5	34 24	2		131.1	31.0	136.1	29.0	184.0	+49.5	177.2	+51.4
6	50 33	.		127.5	32.3	123.2	33.7	192.5	+47.9	197.0	+45.6
7	51 34	3		138.9	38.3	140.4	31.7	192.0	+58.9	180.8	+56.0
8	10 57 53	4		136.1	44.7	135.4	42.5	206.6	+59.8	198.4	+58.5
9	11 4 58	3		201.1	48.8	252.1	47.0	7.9	+76.0	351.2	+43.2
10	9 8	2		224.6	50.3	231.2	47.0	357.7	+61.3	1.7	+56.1
11	19 13	3		244.9	44.0	235.1	38.0	2.0	+46.2	15.2	+49.4
12	23 53	3		261.4	46.3	274.7	40.2	352.4	+37.5	352.2	+25.7
13	24 44	3		221.9	40.2	220.1	34.8	22.6	+59.3	32.6	+57.5
14	29 3	2		244.1	48.2	.	.	359.4	+48.6	.	.
15	11 35 4	2*		159.2	45.3	198.4	43.7	25.9	+72.9	193.4	+76.5

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
16	11 37 28	3		148.9	25.5	152.4	24.5	174.8	+56.7	169.0	+57.0
17	40 28	.		174.3	37.5	.	.	140.7	+78.7	.	.
18	44 38	1.2		292.7	70.3	295.6	53.3	321.6	+38.0	334.9	+25.3
19	44 48	1		156.4	64.7	168.6	63.3	269.7	+69.3	288.9	+73.6
20	47 28	4		100.0	67.0	91.1	62.5	264.8	+52.5	260.8	+42.0
21	57 8	2		228.1	53.3	222.7	49.3	3.5	+60.0	12.7	+62.1
22	11 58 38	3		187.1	50.3	189.9	43.5	4.4	+84.9	62.3	+81.0
23	12 5 58	1		121.7	25.0	156.1	20.2	209.2	+39.3	190.9	+45.1
24	6 43	.		198.1	31.0	123.6	30.3	79.9	+68.0	214.9	+44.0
25	6 48	.		134.2	60.0	139.1	64.5	258.1	+61.4	268.9	+63.4
26	20 23	3		132.9	59.0	148.4	55.3	256.7	+60.8	249.4	+69.5
27	23 28	4		153.4	41.8	171.9	35.3	209.3	+70.8	156.1	+75.8
28	27 13	2		146.1	46.9	165.3	40.8	228.5	+67.3	189.0	+77.3
29	27 23	2		168.2	39.3	167.9	36.5	177.0	+77.9	170.8	+75.2
30	36 43	3		122.2	45.0	141.8	42.8	239.1	+51.2	224.4	+63.1
31	40 8	3		229.3	43.0	234.4	35.0	32.0	+55.8	40.2	+48.2
32	50 53	3		142.2	23.8	142.2	22.3	199.2	+51.5	197.7	+50.4
33	58 48	2.3		156.1	44.0	165.7	40.2	221.7	+73.0	195.2	+76.7
34	12 58 53	3		118.9	40.7	128.1	37.2	240.7	+46.9	230.4	+51.2
35	13 2 13	4		116.1	48.9	108.1	30.0	253.8	+48.9	237.0	+33.5
36	6 19	2		135.6	36.5	147.4	34.3	225.8	+55.1	210.8	+62.2
37	6 24	3		132.1	34.2	131.1	30.0	224.8	+52.1	221.1	+49.4
38	14 28	3.4		172.2	46.8	171.4	39.7	217.6	+84.6	187.2	+79.5
39	18 23	2.3		202.7	43.5	218.7	36.3	60.1	+73.2	60.1	+59.3
40	18 53	2		177.1	33.3	176.1	22.8	151.9	+74.9	150.5	+64.6
41	20 3	1		240.7	59.2	260.0	44.7	11.3	+53.8	23.8	+37.2
42	13 29 58	2		147.2	48.7	153.0	38.8	248.0	+68.4	219.0	+68.5

Nr. 14 und 17 Mitte sehr kurzer Bahnen.

1870. Juli 26. Brünn.

Beobachter: Prof. Felgel und Assistent Bartel.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	11 0 58	4	B	311	35	341	26	328.4	+ 4.9	307.4	—12.9
2	2 45	3	F	43	33.5(:)	49	26.5(:)	255.5	+ 1.3	247.6	− 2.8
3	26 30	3	F	77	35.5	79	31.5	239.3	+18.5	235.2	+16.8
4	28 48	2	B	316	34	325	27	332.1	+ 2.0	327.9	− 7.6
5	11 31 41	1	F	56	58.5	37	50.5	268.4	+27.1	274.3	+14.6

Nr	Mittlere Wiener Zeit	Grösse	Beobachter	Aufang A	Aufang H	Ende A	Ende H	Aufang AR.	Aufang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
6	11 32 40	3	F	69	73.5	96	50.5	277.2	+40.6	243.5	+38.9
7	34 25	3	F	71	35.5	67	33.5	245.2	+15.5	246.5	+11.8
8	47 0	2	F	39	74.5	65	74.5	289.2	+36.5	282.6	+40.9
9	11 58 49	3	F	109	36.5	112	32.5	228 5	+38.4	222.4	+37.9
10	12 1 57	3	B	279	63	273	52	340.3	+39.0	353.8	+35.1
11	4 57	3	F	66	48.5	84	43.5	264.7	+23.0	251.9	+28.1
12	9 24	4	F	14	69.5(:)	36	65.5(:)	301.4	+29.2	290.9	+27.9
13	20 20	2*	F	56	29.5	72	28.5	263.5	+ 3.2	251.5	+10.6
14	23 25	1	F	98	40.5	107	34.5	245.0	+34.1	233.9	+36.0
15	27 13	2	F	86	39.5	94	37.5	252.2	+26.5	245.7	+29.8
16	34 48	2	F	5	44.5	11	37.5	309.7	+ 3.8	304.6	— 2.7
17	34 50	4	F	7	45.5	.	.	308.4	+ 4.7	.	.
18	36 4	4	F	67	39 5	75	38.5	265.9	+16.5	260.3	+19.8
19	43 4	3	F	30	35.5	31	32.5	291.4	— 1.2	289.9	— 2.8
20	47 7	3	F	21	32.5	26	32.5	298.8	— 6.2	294.7	— 5.1
21	48 25	4	F	21	44.5	31	44.5	301.8	+ 5.4	294 9	+ 7.5
22	48 46	3	B	243	43	.	.	30.3	+47.2	.	.
23	50 37	3	B	232	44	211	35	35.5	+54.6	67.8	+63.4
24	12 58 50	3	F	58	47.5	65	45.5	282.1	+18.9	276.7	+20.2
25	13 3 13	1*	F	28	60.5	13	57.5	306.2	+22.1	313.1	+17.3
26	6 16	1*	F	63	55.5	74	46.5	286.6	+27.2	274.3	+25.2
27	9 14	1*	B	309	28	302	21	5.4	— 0.5	14.5	— 3.0
28	15 6	2	B	333	58	355	51	338.3	+19.4	326.7	+10.3
29	13 27 17	3	B	131	51	137	45	258.8	+59.2	244 9	+60.9

Nr. 5 schwach gekrümmte Bahn.
„ 11 langsames Meteor.
„ 17 Mitte der Bahn eines sehr kurzen, grünen Meteores.
„ 22 Mitte der sehr kurzen Bahn.

1870 Juli 27. Brünn.

Beobachter: Prof. Niessl und Assistent Bartel.

Nr	Mittlere Wiener Zeit	Grösse	Beobachter	Aufang A	Aufang H	Ende A	Ende H	Aufang AR.	Aufang Decl.	Ende AR.	Ende Decl.
1	11 27 53	4.5	B	302	69.5	254	67.5	319.3	+35.9	332.7	+50.2
2	30 18	3	N	302.5	62	219.5	79	325.5	+30.3	311.1	+57.2
3	11 50 58	1	B	278	46.5	253	36.5	354.6	+29.2	18.0	+37.1
4	12 1 18	4	B	297	68	288	67	330.5	+36 2	334.1	+38.2
5	12 4 5	2.3	N	351.5	42.5	11.5	49.5	313.0	+ 2.0	299.1	+ 9.3

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.

1870 Juli 28. Wien.

Beobachter: Assistent Palisa, Assistent Schulhof, Holetschek und Borutzky.

Nr.	h m s	Grösse	Beobachter	A °	H °	A °	H °	AR. °	Decl. °	AR. °	Decl. °
1	10 8 5	4	P	49	52.5	27	46.5	249.2	+19.0	259.9	+ 7.6
2	13 30	4	S	197	52	182	53 5	344.2	+78.5	292.6	+84.5
3	15 12	3	P	91	51.5	111	43.5	229.6	+36.2	211.5	+43.3
4	16 53	3.4	P	52	40	57	35.5	242.8	+ 9.5	236.9	+ 7.8
5	19 18	1	P.H.S	90.5	55.5	72.5	42.5	235.1	+38 2	232.3	+20.8
6	28 47	4.5	P	42	53.5	39	46.5	258.8	+17.8	257.3	+10.6
7	33 12	5	P	105	46.5	89	37	221.8	+41.3	221.8	+26.1
8	34 43	3	H	324	49	336	43	308.2	+12.1	302.4	+ 3.7
9	34 47	5	P	90	58.5	97	54.5	242.5	+39.4	235.4	+40.8
10	37 53	4.5	P	49	46.5	58	41.5	253.5	+13.9	245.1	+13.3
11	41 1	3	H	325	33	316	32	315.5	— 3.0	322.7	— 0.6
12	41 17	3	P	27	47.5	25	53.5	268.6	+ 8.5	271.7	+13.8
13	47 5	3	P	88	43	102	33.5	231.0	+29.5	214.5	+31.8
14	53 42	4	S	95	84	104	68	280.8	+48.4	256.4	+48.7
15	54 7	5	B	51	37	65	34	251.2	+ 6.6	240.0	+10.6
16	56 42	5	S	213	53	192	47	355.1	+68.7	24.5	+81.8
17	57 7	5	P	102.5	44.5	111	43.5	227.4	+38.7	222.0	+43.3
18	57 37	4	H	36	51	54	55	268.4	+13.9	260.5	+22.7
19	58 27	3	S	38	78	48	71	281.6	+38.3	274.0	+34.0
20	58 47	3	P	212.5	80.5	172	69.5	300.2	+55.9	283.5	+68.4
21	59 7	2	H	325	34	331	21	319 6	— 2.1	317.4	—16.7
22	10 59 36	4	P	139	48.5	120	54.5	217.4	+63.1	234.6	+53.1
23	11 2 47	4.5	P	112	53 5	119	42	235.9	+48.4	217.4	+47.7
24	5 22	6	P	96.5	59	95	49.5	248 6	+42.7	238.4	+37.2
25	7 22	5	S	185	78	172	71	295.1	+60.2	286.5	+66.9
26	10 47	4	S	235	51	237	47	358.4	+55.1	3.9	+52.5
27	14 25	4.	B	58.5	49	64	47	258.4	+19.5	254.1	+20.3
28	16 42	3	B.P	26	34.5	21.5	29.5	274.3	— 4.1	276.6	— 9.9
29	19 47	2.3	P	82	77.5	123	53.5	278.6	+45.0	236.8	+54.6
30	29 46	2	H	354	65	5	58	301.6	+23.3	296.0	+16.3
31	31 52	3*	P	102	73.5	74	55.5	274.3	+48.9	260.0	+30.7
32	36 55	2.3	P.H	31	41	41.5	33.5	277.7	+ 3 4	267.0	— 0.2
33	38 52	1*	P.S.H	80.5	69.5	55	32 5	273.7	+41.2	257.2	+ 4.4
34	41 52	5	P	111	48.5	116	42.5	239.3	+45.7	229.3	+45.9
35	11 43 58	3	B.S	204	58	188.5	52.0	349.0	+72.7	354.4	+83.3

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
36	11 45 22	4	P	58	60.5	63	67.5	274.4	+28.3	278.1	+34.9
37	48 22	3	P	153	58.5	161	41.5 (:)	256.5	+71.0	194.0	+75.0
38	56 56	4	H	352	48	359	51	311.0	+ 6.5	306.3	+ 9.2
39	11 59 1	3	B.S	226.5	52.5	233	50.5	10.1	+60.6	12.0	+56.1
40	12 0 21	4	B	230	31	229	28	42.4	+48.7	46.6	+47.4
41	5 39	3	P	193	40.5	175	32	72.6	+77.9	142.7	+73.4
42	7 26	3	P	116	34.5	111	30.5	226.6	+41.5	225.9	+35.8
43	10 21	2	P.S	198	70.5	215	63.5	323.8	+66.1	347.3	+65.6
44	10 21	2	B	275	58	266	49	350.4	+36.9	3.4	+36.4
45	14 6	5	B	191	34	221	34	95.9	+73.6	49.7	+56.5
46	19 6	4	B	238.5	24.5	235.5	24	46.9	+38.8	49.9	+40.4
47	21 1	3	P	74	49	62	59	267.0	+26.2	280.4	+28.5
48	12 26 36	1	P	219	12.5	207	30.5	77.5	+41.9	74.0	+62.9

Nr. 3 Dauer $1^1/_2{}^s$
» 4 langsam.
» 12 und 36 Dauer 1^s
» 29 spaltete sich am Ende in zwei Theile.
» 33 bläulich.

Die Beobachtungen wurden wegen Umwölkung des Himmels um $12^1/_2{}^h$ geschlossen.

1870. Juli 28. Kremsmünster.

Beobachter: Prof. Strasser.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	11 32 1	2		236.4	49.2	214.1	43.3	3.7	+53.8	25.6	+66.0

Der Himmel bis auf einzelne zeitweilig sich bildende kleine Wolkenlücken ganz umzogen.

1870. Juli 28. Brünn.

Beobachter: Prof. Niessl.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	10 58 26	3		352	41.5	18	47	297.2	+ 1.0	278.9	+ 7.5
2	11 18 9	4		324	30	353	26	326.9	— 4.1	302.8	—14.5
3	38 46	1*		21	45 (!)	33	27 (!)	286.5	+ 5.9	271.9	— 9.2
4	11 40 43	4		12	53	10	43.5	294.5	+12.7	294.5	+ 3.1
5	12 5 38	2		33	71	100	66	295.9	+32.5	332.5	+70.3
6	10 23	3		19	64	13	50	300.2	+24.2	300.8	+ 9.9
7	14 31	4		326	49	347	34	332.4	+12.5	321.2	— 6.0
8	12 45 3	4		359	50	11	47	318.6	+ 9.2	310.3	+ 6.7

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
9	12 50 9	2		22	58	52	51	307.0	+18.7	287.4	+19.7
10	13 16 6	3		24	75	61	62	318.3	+35.3	296.9	+31.3

Der Himmel während der Beobachtung theilweise umwölkt.

1870. Juli 29. Wien.

Beobachter: Assistent Palisa.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	10 50 21	2		74	35	63	17	234.8	+16.1	231.2	— 4.1
2	10 58 5	4		106	41	111	30	223.0	+38.9	209.0	+35.5
3	11 5 43	3		186	55	205	54	320.2	+82.3	354.1	+73.4
4	8 43	4		37	78	68	76	285.3	+38.2	277.0	+41.5
5	9 19	2		94	76	82	50 (:)	273.9	+47.3	246.9	+30.8
6	23 9	2		141	29	142	19 (:)	189.7	+54.6	178.0	+47.7
7	35 18	4		115	77 (:)	151	61 (:)	281.7	+52.2	259.9	+69.2
8	48 36	5		80	65	59	67	272.2	+38.8	280.7	+33.6
9	51 0	5		68	54	57	51	267.3	+27.2	270.7	+20.5
10	54 49	3		12	43 (:)	37	32	297.4	+ 1.8	275.3	— 3.3
11	11 58 40	2		88.5	53	93	46.5	259.2	+35.8	250.6	+34.4
12	12 0 18	2		152	78 (:)	162.5	46	296.6	+58.4	213.4	+77.9
13	12 37 3	.		305.5	49	.	.	351.0	+18.0	.	.

Nr. 13 stationäres Meteor.
Die Beobachtung öfters durch Wolkenzüge unterbrochen.

1870. Juli 30. Kremsmünster.

Beobachter: Prof. Strasser.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	10 27 58	3		194.6	74.5	195.5	50.2	291.6	+63.0	356.1	+79.7
2	30 53	3		172.5	64.2	174.3	61.0	270.3	+73.2	271.5	+76.9
3	34 53	3		134.7	50.7	157.2	43.3	217.3	+60.8	186.3	+73.4
4	36 3	3		152.3	58.5	172.5	55.0	237.8	+70.7	253.1	+81.8
5	40 53	3		221.3	62.0	241.2	51.5	329.8	+63.3	347.6	+51.7
6	42 43	3		198.3	54.8	232.0	47.3	344.7	+76.8	358.5	+55.5
7	49 58	3		189.0	47.7	203.7	46.1	20.3	+84.0	17.3	+73.8
8	55 48	3		150.0	45.3	161.7	43.7	203.5	+69.4	187.5	+76.5
9	10 58 43	3		214.8	34.2	218.5	22.5	33 8	+60.7	45.8	+50.1
10	11 1 43	2		199.2	37.5	200.8	31.3	49.8	+72.4	60 8	+61.1

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
11	11 4 38	3		149.3	56.4	192.8	34.8	237.3	+69.7	72.0	+73.6
12	19 13	3		169.3	36.3	162.7	35.0	148.4	+75.7	166.2	+71.3
13	11 42 23	2		231.5	23 7	242.8	17.8	44.0	+42.8	39.7	+31.2
14	12 28 18	3		239.2	53.3	222.7	36.7	10.7	+53.3	49.3	+56.8
15	39 3	2		176.7	77.3	215.3	54.5	314.7	+60.9	16.4	+67.3
16	45 33	3		134.3	61.0	148.2	48.4	271.5	+62 0	240.3	+69.0
17	56 8	4		180.0	52.3	193.5	49.5	320.2	+85.9	36.7	+81.1
18	12 57 28	3.4		308.8	78.8	274.7	61.9	331.8	+40.6	357.8	+29.2
19	13 1 13	3		135.2	73.3	146.7	48.2	298.7	+58.2	244.0	+68.0
20	12 13	2		282.7	45.3	300.0	50.0	13.5	+25.3	0.7	+20.9
21	16 23	3		219.8	27.8	235.2	22.0	74.5	+53.6	66.0	+39.3
22	20 43	4		197.2	46.1	188.5	48.7	59.4	+78.1	48.6	+84.3
23	41 23	3		193.0	45.3	211.5	33.3	74.5	+80 6	82.3	+62.2
24	42 58	3		194.8	29.0	192.5	22.5	115.2	+67.8	126.2	+62.5
25	45 53	4		184.2	49.2	207.5	43.8	41.9	+87.0	66.2	+70 5
26	50 43	4		201.0	19.8	200.5	17.7	115.6	+56.9	117.4	+55.8
27	52 58	5		170.2	53.0	181.8	47.7	285.7	+82.1	85.5	+88.6
28	58 43	3		144.0	45.3	172.5	36.8	253.1	+65.4	184.7	+77.3
29	13 59 58	3		169.8	49.0	177.5	36.4	256.7	+83.3	165.7	+78.1
30	14 9 43	3		218.7	45.3	263.7	41.7	60.4	+63.7	41.7	+33.2
31	10 13	3		118.2	48.3	111.5	45.2	273.3	+49.9	272 0	+44.5
32	14 14 13	3		110.3	48.2	101.3	40.0	278.0	+45.2	272.8	+35.4

1870. August 3. Wien.

Beobachter: Assistent Palisa.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	10 28 5	2		238	48	219.5	42.5	357.1	+52 2	16.2	+62.0
2	29 13	2		281	28.5	275	24	352.4	+14.1	359.7	+14.5
3	10 55 1	2		227.5	34.5	229	30	29.5	+52.4	33.8	+48.7

Nr. 2 langsam. Dauer 1ˢ

1870. August 22. Wien.

Beobachter: Assistent Schulhof, Holetschek, Sauter und Borutzky.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	9 24 57	3	B	225	58	233	47.5	344.9	+61.9	3.0	+55.2
2	38 10	4	B	165	46	152	44	198.9	+79.6	203.7	+70.2
3	9 44 50	3	B	213	42.5	214	32 (!)	28.7	+66.4	47.0	+59.8

Nr.	Mittlere Wiener Zeit			Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
						A	H	A	H	AR.	Decl.	AR.	Decl.
	h	m	s			°	°	°	°	°	°	°	°
4	9	44	50	3	Sch	302.5	65	309.5	58 (!)	322.0	+31.6	323.8	+24.0
5		47	40	2	B	148	68.5	141	59.5	271.4	+64.3	249.2	+64.9
6	9	55	18	2	H	76	63.5	77	40.5	267.2	+36.5	247.5	+21.6
7	10	0	59	5	B	258	42.5	247	40.5	6.2	+37.7	14.3	+42.0
8		7	48	5	H	10	39.5	3	34.5	295.1	− 1.8	300.4	− 7.3
9		10	17	5	S	177	58	144	50	294.4	+80.0	231.6	+66.6
10		14	22	6	S	202	46	175	44	34.7	+74.9	165.9	+84.5
11		16	2	2	H.Sch	4	31	0.5	24.5	301.6	−10.7	304.5	−17.3
12		17	3	4	H	5	48.5	24	47.5	302.0	+ 6.8	289.2	+ 7.9
13		19	24	3.4	S.Sch	235	64	208.5	70.5	346.9	+56.9	327.0	+63.9
14	10	42	17	5	Sch	12.5	44	17.5	36	302.6	+ 2.8	297.5	− 4.4
15	11	12	43	4	S	217	19	214	14	80.5	+48.3	88.1	+45.8
16		18	46	4	B	268	57.5	260	54.5	5.1	+39.8	11.4	+42.4
17		26	46	3	B.S	250	18	249.5	17.5	55.1	+26.6	55.8	+26.6
18		27	0	5	S	267	44	245	34	22.1	+32.9	44.7	+40.6
19		43	23	3	Sch	59.5	61	61.5	43	298.2	+29.2	284.8	+16.0
20		44	5	4	B	194	19.5	185	17.5	120.5	+59.1	137.7	+59.0
21		45	47	4	Sch	162.5	40	170.5	31	210.6	+75.0	173.6	+71.2
22		53	19	3	B.Sch	97	68	114.5	54	296.8	+46.2	273.1	+50.0
23		57	57	2	H	89	23.5	85	13.5	256.6	+16.6	253.2	+ 6.7
24	11	58	40	5	Sch	91.5	38	72.5	28	267.3	+28.2	272.0	+ 9.9
25	12	2	13	3	B	247	37	245	31	48.7	+41.1	56.2	+38.8
26		2	19	5	S	196	56	177	54	17.1	+77.5	314.7	+83.9
27		4	35	4	Sch	114.5	62	119.5	50	288.2	+51.9	268.3	+51.4
28		8	18	3.4	Sch	96.5	41	100.5	38	269.6	+33.1	264.5	+33.7
29		25	17	5	Sch	123.5	41	113.5	36	258.6	+50.1	258.9	+40.8
30		45	14	1.2	W	154	36	155	24.5	229.3	+67.4	211.0	+59.2
31		48	1	5	Sch	239.5	60	221.5	58	30.9	+54.5	35.5	+63.7
32	12	50	11	1	H	34	14.5	.	.	308.2	−20.3	.	.

Nr. 22 intermittirend.
» 27 schnell.
» 28 langsam.
» 32 stationäres Meteor.

Himmel nicht ganz heiter; er umwölkte sich von 10^h bis $10^1/_2{}^h$ nach und nach fast vollständig, wesshalb die Beobachtungen um jene Zeit auf $^1/_2$ Stunde unterbrochen wurden; später klärte es sich wieder etwas auf.

1870. September 1. Wien.

Beobachter: Sauter.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
1	10 26 2	3*		100	41	69	29	252.0	+35.2	261.7	+ 8.7
2	36 3	3		188	19	175	18	124.6	+60.1	149.3	+59.5
3	49 33	4		256	20	239	12	49.6	+24.0	69.0	+29.4
4	10 54 39	4		70	29	87	21	268.1	+ 9.3	250.9	+13.5
5	11 1 43	3		107	25	107	15	241.9	+29.5	233.9	+22.5
6	17 43	4		56	52	75	51	297.2	+21.0	286.7	+28.1
7	22 35	1		210	22	214	8	98.4	+54.5	104.7	+40.6
8	11 32 37	2		240	24	216	18	69.0	+37.4	97.3	+48.0
9	12 26 13	4		232	69	246	60	19.0	+57.5	34.5	+51.3

Nr. 7 Ein anfangs schwaches, gegen Ende sehr hell werdendes, langsam einherziehendes Meteor.
» 8 schnell.

1870. September 2. Wien.

Beobachter: Sauter.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	10 16 44	4	S	172	38	162	29	168.3	+78.2	178.3	+66.4
2	17 21	3	S	154	61	191	50	276.7	+70.4	28.1	+82.6
3	17 54	4	S	234	56	232	53 (:)	12.1	+56.8	17.9	+57.4
4	34 49	6	W	172	51	185	48.5	261.9	+84.1	43.8	+86.6
5	10 59 52	3	S	243	28	224	22.5	55.7	+38.1	77.3	+46.7
6	11 40 27	3	S	193	57	185	43	13.9	+78.2	121.4	+83.7
7	12 17 29	2	S	181	21	176	14	164.2	+62.8	173.1	+55.6

Beim Schlusse der Beobachtungen um $12^1/_2{}^h$ fast vollständig umwölkt.

1870 October 18. Wien.

Beobachter: Assistent Palisa.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	9 36 28	4.5		166.5	61	139	49.5	323.1	+75.0	277.6	+63.4
2	45 8	3		183	20	179.5	9	167.4	+61.7	174.2	+50.8
3	9 52 12	3		131	30.5	132.5	21.5	258.0	+49.0	247.2	+43.9
4	10 0 23	2*		211	50.5	147	54.5	69.0	+69.9	296.8	+68.7
5	10 1 32	3.4		203	43.5	196	29.5	95.4	+73.4	138.4	+67.6

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
6	10 25 2	3		184.5	23.5	195	20.5	173.5	+65.0	154.5	+59.8
7	30 46	5		183	36.5	174	28.5	173.1	+78.1	200.3	+69.8
8	38 8	5		131	65.0	130	58.5	327.9	+59.3	315.2	+59.3
9	45 26	4*		216	34.0	189	37.5	113.1	+59.8	153.6	+77.4
10	51 54	2		324	43.0	350.5	45.5	35.8	+ 6.6	16.9	+ 4.0
11	54 52	5		203	40.0	192	55.5	118.9	+71.7	51.8	+79.6
12	10 55 39	4		227	55.5	224	63	68.8	+60.7	53.1	+61.9
13	11 5 39	3		187	17.5	181	14.5	180.5	+58.8	191.8	+56.3
14	13 32	3.4		129	45.5	111	34.5	300.6	+55.7	297.2	+38.3
15	23 23	3		198	23	196	19.5	162.0	+61.0	168.1	+58.5
16	29 58	5		236	58.5	223	41	70.7	+56.1	106.8	+59.0
17	45 14	2.3*		249	38.5	223	52.5	97.7	+40.7	88.1	+62.7
18	46 14	2		110	54.5	103	42.5	329.5	+47.7	318.2	+37.9
19	50 29	2.3		240	37.5	256	34	105.8	+45.9	99.3	+33.4
20	11 54 43	2.3		48	58.5	73	45.5	0.8	+23.8	339.0	+23.2
21	12 0 18	2		346	65.5	1	52.5	33.6	+24.2	26.6	+10.7
22	0 46	3		318	64.5	345	62.5	46.4	+27.3	34.8	+21.4
23	12 2 47	1.2*		114	47.5	112	31.5	322.8	+47.1	305.8	+37.1

Nr. 3 Dauer 1^s Mässig gekrümmte Bahn.
» 4 Dauer des Meteores 2^s—3^s; Schweifspuren lange sichtbar.
» 6 Dauer 1^s
» 7, 11 und 14 schnell.
» 10 röthlich.
» 16 langsam; nebelartig.

1870. October 19. Wien.

Beobachter: Prof. v. Oppolzer und Assistent Palisa.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	9 39 41	4	O	170	19.5	167	15	192.4	+60.2	195.4	+55.2
2	41 21	3	P	270	56.5	280	50.5	38.2	+38.4	39.9	+30.1
3	42 16	4*	O	105	23.5	100	21	269.5	+27.1	271.0	+22.0
4	43 16	4.5	P	263	39	277	45.5	59.7	+32.2	46.2	+28.3
5	9 55 50	5	O	179	25.5	183	19.5	179.5	+67.3	171.2	+61.2
6	10 1 35	2*	O	146	25(:)	142	21	239.8	+54.7	240.2	+49.3
7	2 58	2	P	68.5	48.5	87	39	316.7	+23.3	299.0	+26.3
8	9 12	2.3	P	56.5	32.5	70.5	27 (!)	315.4	+ 5.2	302.4	+ 8.0
9	18 29	4	P	123.5	29	118.5	22	270.5	+43.2	267.2	+35.0
10	10 25 53	3	P	103	36.5	106	26 (:)	293.1	+34.4	281.7	+29.5

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
11	10 31 58	2*	P	351.5	48	33	33	11 8	+ 6.5	338.8	— 3.6
12	35 29	4	P	35	49.5	41	48	344 6	+12.2	340.2	+12.6
13	42 20	3	O	153	47.5	149	36.5	286.7	+72.0	262.9	+64.6
14	49 52	1	O.P	95	27.5	99	22	296.4	+23.3	289.4	+22.1
15	10 54 44	3*	P	54	43.5	63	30	334.7	+13.3	320.8	+ 6.4
16	11 4 11	5	P	301	52.5	320	44	48 6	+22.5	42.1	+ 8.7
17	5 48	4.5	P	68	62.5	82	53	343.9	+33.1	329.5	+32.7
18	11 46	2	P	0	66.5	354	65	16.1	+24.7	18.9	+23.5
19	17 43	6	O	211	39.5	211	37.5	117.6	+66.2	121.6	+65.1
20	21 28	1*	P	56	70(:)	261	73.5	358.0	+35.0	43.1	+48.1
21	24 39	3	O	235	33.5	224	29.5	108.3	+46.9	122.2	+51.6
22	26 58	4.5	P	20	35	14	24	3.5	— 4.8	6.5	—16.7
23	28 17	2	P	96	55	115	45	331.5	+40.6	311.3	+46.6
24	29 31	3	O	174	38.5	172	28.5	226.9	+79.3	220.8	+69.4
25	32 50	2*	P	248.5	59	283.5	65	69.5	+49.8	52.6	+37.5
26	39 3	2*	O	203	44.5	184	40.5	117.6	+73.8	181.1	+81.8
27	42 25	5	O	149	30.5	143	27.5	268.2	+60.5	271.4	+54.7
28	43 5	1.2	P	48	33	43	22.5	345.4	+ 1.9	344.4	— 9 5
29	45 51	1.2	O	195	10.5	187	8	181 1	+50.3	193.9	+49.3
30	47 48	5	P	1	57 5(!)	7	46.5	24.6	+15.7	20.4	+ 4.9
31	49 32	4 5*	O	205	24.5	196	22.5	156.9	+59.2	173.5	+61.3
32	55 53	2*	P	314	52.5	349	57	54.8	+18.0	33.6	+15.6
33	56 35	4.5	P	33	52.5	52	49	7.4	+14.5	354.6	+17.1
34	56 57	2*	O	191	54.5	171	46.5	70.8	+80.7	285.3	+83.6
35	11 58 39	3	P	21	38	22	35	11.4	— 1.7	9.9	— 4 4
36	12 2 30	1*	P	356	62	13	43.5	30.8	+20.3	19.4	+ 2.4
37	4 23	1*	O	270	32.5	263	32	96.3	—23.6	101.1	+27.7
38	4 29	4.5	P	344	34	0	28	42.6	+ 6.5	29 3	—13 8
39	10 0	1.2	P	301	26.5	308	20	81.2	+ 1.4	79.0	— 7.5
40	10 49	3	O	229	31	23.5	29	127.6	+49.4	10.1	—10.0
41	14 13	2	O	265	19.5	258	16	112.0	+17.7	119.7	+19.8
42	21 20	2	O	142	33.5	141	28	290.3	+58.1	283.9	+53.9
43	23 33	2.3	P	48.5	60	50.5	57.5	9.7	+25.0	7.1	+23.6
44	24 53	5	P	298	71.5	312.5	83	55.2	+37.4	41.6	+43.2
45	29 9	5	O	127.5	57	142	19.5	342.3	+57.8	322.9	+65.2
46	31 50	4	P	348	41	345	30(:)	45.2	— 0.2	49.5	—10.7
47	33 39	5	O	198	25.5	201	21.5	178.3	+63 2	177.0	+58.4
48	35 23	6	O	180	8	175	6	217.1	+49 8	224.5	+47.6
49	40 7	4.5	P	58	62	63	62.5	11.0	+29.5	9.3	+31.4
50	12 41 50	4	P	11	54	31	41	32.1	+12 6	15 8	+ 3.4

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.
	h m s			°	°	°	°	°	°	°	°
51	12 46 28	4.5	P	78	55	87	45(:)	358.4	+32.1	345.1	+30.2
52	50 2	2	P	76.5	69.5	89	58	14.3	+40.1	357.9	+38.7
53	51 34	2*	O	182	35.5	180	21.5	213.6	+77.2	221.1	+63.3
54	55 35	4.5	P	48	70	67	59(:)	24.4	+33.2	8.7	+30.3
55	56 40	3	P	69	25	69	14	344.2	+ 5.6	337.2	— 2.9
56	56 56	3	O	168	27.5	168	20.5	251.1	+67.3	246.0	+60.7
57	12 58 36	4	P	89	50.5	87	35.5	352.3	+34.6	340.2	+23.8
58	13 0 7	3.4	P	46	59.5	50	44	19.6	+24.0	8.9	+12.1
59	1 48	4	P	333	42	344	39	63.5	+ 3.3	56.1	— 1.6
60	3 6	2	P	142	68.5	146.5	50	14.9	+62.3	331.4	+68.2
61	13 7 47	5	O	134	23.5	137	20.5	297.6	+46.2	291.8	+45.9

Nr. 3 langsam; Schweifspuren lange sichtbar.
» 5, 13 und 40 sehr schnelle; Nr. 14, 15 und 26 schnelle Meteore.
» 6 sehr langsam; Nr. 8 und 48 langsam.
» 7 röthlich; Dauer $1\frac{1}{2}^s$.
» 8 röthlich; Dauer 2^s.
» 11 Dauer $1\frac{1}{2}^s$.
» 18 und 19 fast stationäre Meteore.
» 20 roth.
» 28 und 32 gelb.
» 38 ausgedehnter nebelartiger Ballen.

Die Schweifspuren blieben bei manchem der Meteore sehr lange sichtbar, so z. B. bei Nr. 34 durch 5^s; bei Nr. 25 und 26 durch 4^s; bei Nr. 32 und 37 durch 3^s; bei Nr. 36 durch 1^s etc. etc.

1870. October 22. Wien.

Beobachter: Assistent Palisa, Assistent Schulhof, Holetschek und Leitzinger; Anfangs auch Prof. v. Oppolzer.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	9 3 15	2	Sch	223.5	33	221	15	85.8	+54.2	107.2	+42.8
2	9 50	4	Sch	159	58	157	53	304.5	+74.2	285.3	+74.7
3	14 25	2	H	301	43.5	300	35.5	29.8	+15.3	35.3	+ 9.3
4	20 28	1	Sch	178	28	182	12	176.4	+69.7	167.9	+53.7
5	22 25	5	P	255.5	71.5	332.5	62.5	19.9	+49.5	5.1	+22.9
6	28 35	5.6	Sch	103	75	119	55	330.3	+49.4	297.2	+52.7
7	31 30	6	P	355.5	67	333.5	55.5	355.9	+25.3	9.1	+16.0
8	33 52	6	Sch	256	69	225	59	26.4	+48.9	45.1	+61.8
9	40 20	2	P	13.5	50.5	24.5	36.5	347.5	+ 9.4	336.8	— 2.5
10	9 47 6	3.4	O	237.5	21.5	242.5	17.5	97.1	+37.4	96.5	+31.2

Nr.	Mittlere Wiener Zeit			Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
						A	H	A	H	AR.	Decl.	AR.	Decl.
	h	m	s			°	°	°	°	°	°	°	°
11	9	56	53	5	P	27.5	82	41.5	61.5	355.5	+41.0	340.0	+24.7
12	10	0	40	6.7	P	356.5	69.5	10.5	71.5	2.6	+27.7	357.3	+30.0
13		2	53	5	P	95.5	46	87.5	44.5	303.7	+35.5	306.3	+30.1
14		7	46	3.4	L	246.5	25	235.5	25	92.1	+33.8	100.7	+41.1
15		9	43	1	P	10	58.5	0.5	39.5	358.0	+17.0	3.1	− 2.3
16		11	0	1	Sch	198	49	171	39	83.2	+78.1	222.3	+78.7
17		15	41	1	Sch	222	66	243	64	40.3	+61.9	45.9	+53.4
18		20	56	1*	Sch	133	36	113	29	274.4	+53.7	281.1	+36.2
19		25	54	5	P	73.5	50	87.5	41	324.0	+26.6	309.1	+27.9
20		35	39	4	Sch	287.5	30	286.5	25	67.4	+11.5	71.3	+ 8.2
21		37	45	3	H	143.5	46.5	156.5	33.5	290.4	+65.4	249.1	+67.1
22		38	48	1.2	P	110.5	75.5 (:)	100.5	60.5	348.8	+51.3	327.4	+45.2
23		39	10	3	Sch	311	18	327	11	57.9	−10.7	46.7	−24.0
24		39	39	3.4	P	31.5	36	47.5	28	346.0	− 1.2	330.3	− 2.8
25		43	4	3	P	59.5	58.5	79.5	53	341.3	+27.3	327.8	+31.5
26		45	7	4	P	109.5	55.5	121.5	49.5	319.8	+47.8	307.1	+52.4
27		46	7	4.5	Sch	238	59	220	56	62.6	+55.2	69.7	+64.6
28		51	12	3	P H	138.5	31.5	143.5	31	271.2	+54.6	265.5	+57.5
29		54	49	3	P.S.H	124	56.5	143.5	44	320.3	+55.8	289.1	+64.6
30		55	44	1.2*	Sch	306	57	323	60	44.0	+24.3	34.0	+22.3
31	10	58	45	2.3	P	91.5	80.5	103.5	54.5	1.6	+47.6	323.8	+44.2
32	11	5	23	4	P	81.5	53.5	93.5	49.5	333.0	+32.7	323.7	+36.4
33		24	28	2.3	P	71.5	70.5	62.5	52.5	358.2	+39.2	346.1	+23.9
34		26	13	1	P.Sch	346	47.5	336.5	35.5	32.2	+ 6.5	41.7	− 3.6
35		28	30	6	P	16.5	42.5	24.5	38.5	11.2	+ 1.8	4.3	− 0.5
36		34	15	5	P	79.5	63.5	89.5	61	350.9	+37.8	345.1	+40.4
37		37	45	2*	P	26.5	38.5	33	22	5.2	− 0.2	354.3	−13.8
38		39	12	4	L.Sch	286.5	28	278.5	26.5	85.4	+10.5	91.9	+14.1
39		40	12	1*	P	152.5	27 (:)	146.5	12	261.3	+59.3	255.2	+44.3
40		42	15	1	P	22.5	37.5	28.5	25.5	9.0	− 1.9	0.5	−12.0
41		45	5	4.5	P	112.5	39.5	119.5	36.5	313.4	+42.2	305.6	+45.0
42		46	20	5	L.Sch	264.5	30	264.5	39	100.3	+25.4	92.6	+31.3
43		47	52	5	P	22.5	51.5	39.5	44	14.1	+11.6	0.5	+ 8.5
44		52	30	5	L	252.5	42	254.5	28	97.7	+40.4	110.1	+30.5
45	11	58	46	1.3*	P	67.5	53.5	80.5	37	352.9	+26.6	333.2	+21.2
46	12	0	23	4.5	P	97.5	33.5	104.5	31	320.5	+29.0	313.8	+31.8
47		1	2	2	P	113.5	45.5	119.5	38.5	323.9	+45.8	311.9	+46.2
48		2	30	4.5	P	30.5	62.5	51.5	46.5	17.0	+23.3	357.9	+14.8
49		5	57	3.4	P	85.5	61.5	104.5	54.5	354.9	+39.0	340.4	+44.7
50	12	8	31	6	P	60.5	45	63	50.5	353.2	+17.2	355.5	+22.5

Nr.	Mittlere Wiener Zeit			Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
						A	H	A	H	AR.	Decl.	AR.	Decl.
	h	m	s			°	°	°	°	°	°	°	°
51	12	13	33	3	P	353.5	47.5	6.5	36.5	38.9	+ 5.9	29.3	— 5.1
52		18	18	1.2	P	30.5	71	46.5	69	24.5	+31.1	17.8	+32.1
53		19	15	5	P	0.5	74.5	0.5	58.5	35.8	+32.7	35.7	+16.7
54		22	35	4	P	169.5	66.5	182.5	47.5	24.0	+70.9	145.8	+88.0
55		22	55	4.5	Sch	332.5	37	325.5	31	58.5	— 1.3	66.1	— 4.9
56		26	31	3	P	3.5	79.5	356.5	85.5	37.0	+37.7	38.2	+43.7
57		26	43	3*	Sch	231.5	44	221.5	36	114.8	+54.7	134.2	+57.3
58		32	38	4.5	Sch	277.5	54	275.5	53	83.6	+33.5	85.5	+33.8
59		39	19	4	L	285.5	14	279.5	16	110.3	+ 0.4	113.4	+ 5.7
60		39	25	2	P	42.5	23.5	46.5	18.5	2.2	— 8 6	356.4	—11.4
61		40	48	2	P	61.5	22 5	67.5	15.5	347.2	— 0.5	338.4	— 2.6
62		41	50	2.3	P	329.5	25.5	340.5	19.5	69.5	—11.3	61.2	—20.1
63		43	4	4*	H	261	43.5	258	41.5	104.3	+36.2	107 9	+36.7
64		45	30	2	H	214	40.5(!)	209	28.5(!)	137.5	+64.7	163.5	+60.2
65		46	45	2	P.Sch	103.5	35	103.5	26	329.7	+33.8	321.8	+27.9
66		46	54	2*	P	330.5	64.5	38	65	56.5	+25.0	25.9	+27.0
67		49	33	5	P	356.5	57	359.5	51.5	45.6	+15.2	43.9	+ 9.7
68	12	57	32	4.5	Sch	147	27	140	18	287.9	+56.8	286.7	+45.7
69	13	0	26	2	P	56.5	20.5	61.5	15.5	354.7	— 4.7	347.9	— 6.2
70		0	35	2	P	2.5	20.5	356.5	14.5	43.9	—21.3	50.2	—27.2
71		0	49	4	L	253.5	44	248.5	43	112.1	+40.8	115.9	+43.4
72		2	41	4	W	311.5	45.5	323 5	43	79.4	+12.9	72.9	+ 6.7
73		3	6	2	P	33.5	44	36.5	37	23.4	+ 6.7	18.6	+ 1.1
74		3	11	2	P	21.5	41.5	13.5	35.5	31.8	+ 4.6	36.0	— 5.4
75		5	45	2	Sch	70	62	87	33	15.8	+33.4	343.0	+22.1
76		5	53	4	Sch	99	27.5	94	21.5	330.9	+25.9	330.4	+19.1
77		6	10	3	P	1 5	49.5	358.5	36	46.8	+ 7.7	49.1	— 5.8
78		7	23	1	P	41.5	28	45.5	21	12 1	— 5 2	5.6	— 9.6
79		10	4	2	P	47.5	51	61.5	42	19.6	+17.2	6.1	+15.2
80		10	45	1*	P	352.5	75	12.5	47.5	51.3	+33.2	40.4	+ 6.3
81		15	27	2	H	298	46.5	301	33.5	90.1	+19.0	96.3	+ 7.2
82		16	15	3	L	282.5	48	291.5	47.5	97.5	+27.2	93.3	+22.6
83		17	58	2*	P	232.5	44.5	351.5	38.5	70.0	+ 5.8	57.1	— 3.0
84		18	9	2	L	271.5	48	265.5	40.5	103.5	+32.8	113.6	+31.6
85		18	40	2	P	30.5	49.5	26	48.5	31.3	+11.1	33.8	+ 9.3
86		22	55	5.6	Sch	223	33	213	26	151.4	+54.6	170.8	+56.0
87		25	22	3	L	263.5	42	259.5	42	115.2	+33.7	117.2	+36.1
88		26	0	3	Sch	200	32	187	28	182.4	+67.9	215.2	+69.1
89		26	38	3	H	218	49.5	211	33.5	125.5	+65.2	163 9	+62.6
90	13	28	7	2	P	243.5	78 5	335.5	68.5	70.3	+52.2	63.3	+28 1

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
	h m s			°	°	°	°	°	°	°	°
91	13 30 2	3*	Sch	321.5	50	335.5	47	78.0	+13.6	70.3	+ 7.6
92	36 57	3	P	51.5	62.5	64.5	43.5	31.4	+28.0	12.1	+17.7
93	39 2	3	L	253.5	22	244.5	14	142.5	+27.0	155.7	+27.3
94	40 13	1*	P	357.5	48	11.5	34	58.0	+ 6.2	46.7	— 7.1
95	42 27	3	L	289.5	52	281.5	51	97.3	+26.7	102.1	+29.7
96	44 24	4	P	157.5	51.5	155.5	41.5	348.6	+75.1	315.2	+71.4
97	45 5	1*	P.Sch	331.5	75.5	80.5	72	65.9	+35.1	33.1	+42.4
98	58 37	3.4	P.H	223.5	40.5	213	28	148.5	+58.4	177.4	+57.5
99	13 59 52	3	Sch.L	299.5	57.5	305	66	92 9	+26.9	84.3	+31.7
100	14 5 53	2	P	89.5	38.5	91.5	31.5	0.9	+27.3	354.0	+23.8

Nr. 1 sehr langsam.
» 22 und 40 gelb.
» 25 nebelartig.
» 31 intermittirend.
» 34 weiss; langsam.
» 40 und 52 Dauer 1^s
» 47 langsam; Dauer 1^s
» 75 schnell; Nr. 88 sehr schnell.
» 76 sehr langsam; Bahn stark gekrümmt: ging durch Az = 98.°0 H = 24.°5.

Die Schweifspuren mancher Meteore bleiben wieder sehr lange sichtbar, so z. B. von Nr. 97, das sich durch eine röthliche Farbe auszeichnete, durch 7^s; von Nr. 37 und 39 durch 5^s; von Nr. 45 und 66 durch 4^s; von Nr. 80 und 83 durch 3^s und 2^s resp. etc. etc. In den späteren Abendstunden schien ein Radiant im Widder und gegen den Schluss der Beobachtungen einer in den Zwillingen stark vertreten zu sein.

1870. October 23. Wien.

Beobachter: Assistent Palisa und Assistent Schulhof.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.
1	9 33 37	2	P	105	28.5	106.5	25	275.5	+30.5	271.5	+29.1
2	9 52 27	3	P	121.5	54	126.5	43	302.0	+53.8	282.7	+53.0
3	10 2 23	2	Sch	303.5	41.5	302.5	32.5	42.5	+13.1	48.4	+ 5.6
4	7 0	3	P	105.5	49	93.5	48	305.1	+42.8	308.6	+35.5
5	35 21	2.3	Sch	297.5	31.5	308.5	18.5	60.6	+ 7.3	59.6	— 9.0
6	53 34	3	P	244.5	36	256	35	95.2	+42.1	89.1	+34.1
7	10 58 33	2	P	99	58	79	54	330.6	+43.5	333.8	+31.9
8	11 2 32	1	P	147.5	29 (:)	143.5	10.5	261.9	+58.6	249.1	+41.5
9	3 18	6	P	138.5	56	154	56.5	320.8	+63.8	325.4	+72.2
10	11 3 34	3	Sch	109.5	32.5	85.5	28	298.6	+36.0	310.5	+17.7

Nr.	Mittlere Wiener Zeit			Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
	h	m	s			A	H	A	H	AR.	Decl.	AR.	Decl.
11	11	4	36	4	Sch	6°.5	74°.5	18°.5	61°.5	16°.1	+32°.7	8°.8	+20°.7
12		6	28	4	P	179.5	62	172.5	57	17.7	+76.2	354.3	+80.1
13		11	38	5	P	197.5	43	172.5	40.5	126.6	+76.7	237.6	+80.6
14		13	23	5	P	122	25	124.5	20	284.8	+39.5	278.2	+37.5
15		14	37	3.4	P	135.5	23.5	138	16	271.8	+47.1	262.3	+43.0
16		19	54	3.4	Sch	339.5	24.5	354.5	21.5	41.4	—15.0	27.5	—20.1
17		21	23	5	P	148.5	62	157.5	53	342.0	+67.7	319.2	+75.0
18		21	49	4	P	183.5	14(:)	185.5	6	196.6	+55.6	194.4	+47.5
19		22	45	3	P	148.5	48(!)	149.5	34.5(!)	304.1	+69.1	272.8	+63.6
20		24	48	2	P	180.5	81	307.5	77 (:)	23.5	+57.2	36.6	+39.4
21		29	7	3	P	88	32.5	90.5	24.5	318.7	+22.3	311.0	+18.3
22		31	35	3	Sch	244.5	41.5	215.5	36.5	98.4	+45.1	126.0	+61.6
23		37	31	3.4	P	46.5	50	61.5	44	357.4	+16.0	345.2	+16.8
24		41	21	3	P	11.5	61	27.5	42	21.5	+19.6	7.4	+ 3.4
25		48	0	3	P	34.5	40 (:)	38.5	32(:)	3.4	+ 3.3	357.1	— 2.7
26		51	15	3	P	172.5	46	180.5	40	279.3	+84.4	207.3	+81.7
27	11	54	52	1*	P	219.5	74.5	150.5	64.5	50.1	+58.9	357.6	+67.3
28	12	0	47	3	Sch	263.5	49.5	279.5	53.5	87.3	+38.0	76.3	+32.3
29		2	43	3	Sch	276.5	41.5	270.5	37.5	88.6	+26.0	95.4	+26.7
30		5	37	3	P	83.5	63	89.5	56.5	358.0	+39.1	348.4	+38.2
31		9	10	4	Sch	303.5	31.5	293.5	28.5	79.9	+ 4.3	88.7	+ 7.0
32		12	15	3	P	77.5	42	70.5	33	343.2	+23.0	341.0	+12.6
33		17	16	4	P	38	73	72.5	66	23.8	+34.1	7.3	+36.8
34		20	7	3	Sch	193.5	12.5	185.5	7.5	195.2	+52.5	208.8	+49.0
35		22	2	4	P.Sch	152	54	129.5	50	336.6	+71.7	330.2	+57.5
36		26	50	3	Sch	313.5	40.5	323.5	40.5	72.8	+ 7.7	65.9	+ 4.3
37		27	37	4.5	P	98.5	64	102.5	58	0.8	+45.5	351.9	+45.1
38		28	32	3	P	142.5	41	144.5	35	308.2	+62.7	295.8	+60.7
39		29	4	3	P	221.5	76	138.5	77	57.0	+57.4	23.5	+57.0
40		29	23	4.5	Sch	257.5	38.5	248.5	35.5	108.8	+35.2	117.2	+39.2
41		33	8	3	P	110.5	31.5	115.5	26(:)	319.4	+36.0	310.7	+35.8
42		35	9	3.4	P.Sch	251	51	238	50	99.4	+45.8	105.7	+52.9
43		39	44	4.5	P	84.5	66	93.5	54	9.7	+40.8	353.2	+38.8
44	12	45	53	5	P	206.5	40	191.5	37	147.2	+69.4	182.5	+76.0

Nr. 3 langsam, Dauer 2^s, nach und nach stärker werdend.
» 8 Dauer 3^s
» 10 schwach gekrümmt; Dauer 2^s
» 27 Schweifspuren 6^s lang sichtbar.
» 29 langsam.
» 35 sehr schnell.
» 36 Dauer 2^s

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
				A	H	A	H	AR.	Decl.	AR.	Decl.

Anfangs Nebel; später Federgewölk, das sich allmählich verdichtete; gegen Schluss der Beobachtung umwölkte sich der Himmel sehr rasch.

1870. November 9. Wien.

Beobachter: Assistent Palisa.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	6ʰ 28ᵐ ˢ	♀*		° .	° .	° .	° .	307°	+38°	287°	+30°

Schönes rothes Meteor mit rasch vergänglichem Schweife.

1870. November 13 Wien.

Beobachter Assistent Palisa, Assistent Schulhof und Schramm.

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	14 10 13	3	Sch	64.5	44	78.5	38	42.4	+18.1	29.8	+20.8
2	21 14	2	S	355.5	44	26.5	33	91.5	+ 2.3	66.1	— 5.4
3	24 17	1.2	S	351.5	46	35.5	32	95.0	+ 4.5	59.4	— 3.7
4	25 3	4	Sch	126.5	45	125.5	32	14.7	+53.8	358 1	+46.3
5	25 20	1	P	239.5	11	233.5	8	195.4	+28.3	202.8	+29.8
6	34 19	4*	Sch	185.5	50	168.5	37	152.9	+86.0	312.7	+76.0
7	34 45	4	S	55.5	26	43.5	26	43.7	— 0.7	53.2	— 6.1
8	38 16	1*	P	234.5	19	225	13	196.5	+37.5	210.3	+38.5
9	40 47	2.3	S	358.5	40	19.5	27	94.4	— 1.8	75 4	—12.7
10	42 59	1.2	P.Sch	209.5	47	216.5	18.5 (!)	176.2	+70.1	216.0	+48.1
11	44 45	1*	P	224.5	16	214.5	11	210.1	+41.5	224.7	+43.0
12	47 48	2*	S	358 5	38	34.5	26	96.1	— 3.8	63.8	— 9.5
13	48 2	3	P	205.5	27	185.5	20	222.7	+61.0	264.1	+61.4
14	48 33	3	S	344.5	56	19.5	36	104 1	+15.0	79.4	— 4.0
15	50 16	3	P	285.5	49	277.5	34	140.5	+26.4	156.6	+20.1
16	54 7	2.3	P.Sch	248.5	36	245.5	29	173.7	+39.5	182.7	+37.1
17	56 26	3.4	S	45.5	41	62.5	30	64.1	+ 7.8	46.5	+ 6.1
18	58 23	2.3	S	14.5	45	34.5	31	87.4	+ 4.0	68.4	— 4.9
19	58 42	2 3	Sch	95.5	39	101.5	29	32.9	+31.3	20.5	+28.6
20	14 59 40	1*	P	244.5	29	234.5	23	184.9	+37.8	198.3	+40.4
21	15 0 3	3.4	S	28.5	28	44.5	18	72.7	— 9.6	54.9	—12.7
22	2 35	1*	Sch	225.5	52 (!)	195.5	41	163.7	+61.1	216.1	+76.9
23	5 29	1*	P.S	354	40	16.5	29.5	103.9	— 1.6	84.7	—10.9
24	5 49	1	Sch	234.5	31	246.5	25	191.7	+45.5	188.5	+33.8
25	15 8 29	1*	Sch	269.5	28	259.5	23	170.9	+20.8	181.5	+23.7

Nr.	Mittlere Wiener Zeit			Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
						A	H	A	H	AR.	Decl.	AR.	Decl.
	h	m	s			°	°	°	°	°	°	°	°
26	15	9	25	2.3*	S	224 5	27	217.5	22	205.6	+49.6	218.1	+50.3
27		9	50	2.3	Sch	302.5	53	331.5	44	133.7	+22.3	120.5	+ 5.5
28		10	29	3	Sch	205.5	38	201.5	28	210.0	+69 0	233.3	+63.9
29		11	19	2	Sch	147.5	42	138.5	34	7.7	+66.5	1.5	+56.1
30		13	50	2.3	P	162.5	32	146.5	25	327.0	+69.1	342.1	+55.0
31		15	3	1	P	228.5	8	227.5	2	219.8	+32.7	224.7	+28.5
32		15	52	2	Sch	27.5	30	39.5	19	78.0	— 8.0	63.6	—14.0
33		16	43	2.3	S	279.5	65	99.5	64	134.6	+39.0	63.8	+46.0
34		18	29	3	S	234.5	33	239.5	12	192.6	+46.9	207.9	+29.0
35		18	29	5	P	227.5	45	215.5	42	180.1	+57.7	193.3	+64.4
36		19	9	1.2	S	166.5	32	150.5	20	319.8	+70.8	333.3	+53.1
37		22	19	2.3*	Sch	107.5	58	104.5	46	55.0	+47.5	41.1	+40.7
38		23	0	3	S	230.5	43	211.5	29	182.9	+55.0	220.7	+59.2
39		25	20	2	P.S	200.5	20	190.5	16.5	246.8	+57.3	265.5	+57.1
40		25	29	3	Sch	43.5	36	41.5	21	70.5	+ 2.7	65.2	—11.5
41		26	50	3	S	192.5	32	172.5	22	250.0	+71.2	300.3	+63.1
42		29	22	2*	P.S	180	16.5	167.5	9.5	285.3	+58.3	304.7	+49 9
43		30	39	3	Sch	47.5	28	42.5	24	64.9	— 2.8	67.0	— 8.4
44		31	35	1*	Sch	4.5	57	46.5	44	103.4	+15.3	73.8	+10.8
45		31	53	3	P	228.5	36	223.5	29	196.6	+52.7	209.9	+51.6
46		32	21	2.3	S	187.5	23	169.5	12	270.1	+64.1	303.2	+52.7
47		35	41	2	S	120.5	42	116.5	26	31.4	+48.6	16.5	+36.4
48		38	17	2	P.S	201	29	212.5	21	239.8	+64.9	232.3	+52.3
49		40	20	1	P	182.5	30	189 5	20	281.1	+71.6	269.5	+60.8
50		41	25	2*	P	141.5	28	135.5	17.5	358.1	+54.2	352.7	+43.3
51		42	36	1	P.S	226.5	12 (!)	221.5	6.5(!)	225.7	+37.1	234.6	+35.5
52		43	58	2.3	S	262.5	46	267.5	71	168.1	+36.6	136.7	+45.5
53		44	52	2.3*	P	132.5	35	125.5	22.5	16.3	+52.7	8.3	+40.0
54		50	16	2.3	Sch	80.5	38	95.5	25	53.6	+21.8	34.0	+21.9
55		53	34	2	S	154.5	60	130.5	40	69.6	+71.1	27.0	+54.1
56		54	49	3	S	151.5	30	165 5	24	352.1	+61.6	322.3	+63.2
57		55	31	2	S	208 5	40	214.5	27	213.3	+68.1	227.8	+55.9
58		55	58	2	P	322.5	38	330.5	34	140.3	+ 2.3	136.2	— 3.7
59	15	56	25	2	S	267.5	70	283.5	47	141.2	+45.2	159.6	+26.0
60	16	0	24	2	P	249.5	50.5	213.5	47	172.8	+46.3	193.5	+67.6
61		0	49	3.4	S	220.5	40	205.5	46	203.9	+60.1	200.9	+72.5
62		6	32	2.3	S	264 5	65	312.5	57	150.8	+44.7	140.3	+22.3
63		8	39	1	P.S	280.5	47	269	33.5	164.2	+27.6	181.9	+25.0
64		10	39	1	P.S	185	26.5	201	17	283.6	+68.0	259.6	+54.4
65	16	32	31	1.2	S	78.5	24	87.5	12	55.7	+10.5	41.1	+ 7.2

Nr.	Mittlere Wiener Zeit	Grösse	Beobachter	Anfang A	Anfang H	Ende A	Ende H	Anfang AR.	Anfang Decl.	Ende AR.	Ende Decl.

Nr. 1 sehr schnell.
» 5 roth.
» 8, 10, 11, 22 und 25 röthlich.
» 10 und 44 schwach gekrümmt.
» 20 ging durch den Stern 12 Can ven (Cor Caroli).
» 24 sehr langsam.
» 53 Schweif lange sichtbar.

Der Himmel mit Federgewölk (Polarbanden) umzogen, das sich immer mehr verdichtete; beim Schluss der Beobachtungen ganz bedeckt. Aus der angegebenen Ursache die Grösse der Meteore wohl oft unter chät t.

1870. November 29. Wien

Beobachter: Assistent Palisa, Holetschek, Schramm und Borutzky.

Nr.	Mittlere Wiener Zeit h m s	Grösse	Beobachter	Anfang A °	Anfang H °	Ende A °	Ende H °	Anfang AR. °	Anfang Decl. °	Ende AR. °	Ende Decl. °
1	9 23 6	4	B	138.5	49	143.5	47.5	316.8	+63.0	311.4	+65.7
2	25 56	4	P	284.5	51	270.5	50	73 8	+28.5	81.3	+34.5
3	30 1	4	B	162.5	59	166.5	50	354.0	+75.1	317.5	+81.0
4	34 26	4	P	281.5	35	281.5	32	90.1	+18.6	92.1	+16.4
5	44 11	2	P	295.5	22	294.5	15	91.4	+ 0.7	96.4	— 4.2
6	9 57 11	4	H	157.5	36	171.5	40	279.7	+69.5	257.4	+79 8
7	10 2 56	3	S	346.5	68	344.5	55	44.9	+26.9	48.4	+14.0
8	6 49	2	H.B	181.5	42	180.5	33	210.0	+83.6	218.6	+74.8
9	8 21	3	S	231.5	55	347.5	39	98.7	+58.1	50.3	- 2.0
10	10 18	2	H	151.5	37	145.5	24	293.3	+66.4	281.9	+53.6
11	11 21	3	P	132.5	25	129.5	22	296.8	+46.3	296.6	+42.3
12	11 51	3	B	89.5	22	87.5	16	326.9	+15.9	324.2	+10.1
13	14 26	3	P	334.5	19.5	.	.	67.5	—18.5	.	.
14	10 18 21	3	P	30	16	29	14	12.2	—20.4	12.4	—22.7

Nr. 4 stark gekrümmt.
» 5 langsam
» 13 Mitte einer sehr kurzen Bahn.

Wegen Bewölkung des Himmels die Beobachtung um $10^{3}/_{4}{}^{h}$ abgebrochen.

1870. December 11. Kremsmünster.

Beobachter: Prof. Dr. Strasser.

Nr.	Mittlere Wiener Zeit h m s	Grösse	Beobachter	Anfang A °	Anfang H °	Ende A °	Ende H °	Anfang AR. °	Anfang Decl. °	Ende AR. °	Ende Decl. °
1	6 43 34	3		279 0	43.7	278.9	33 2	51.5	+26.1	59 8	+18 7
2	6 57 29	1.2		202.5	60.7	256.3	51.5	39 9	+72.2	57.9	+43 1
3	7 5 44	4		302.0	56.6	304.7	44.8	35.5	+25 4	41.4	+14.8
4	22 59	4		188.9	57 8	188.8	44.7	29.5	+79.2	125.3	+82.9
5	7 39 14	3		271.5	48.6	289.4	35 8	65.1	+32.0	65.2	+14.6

Nr.	Mittlere Wiener Zeit			Grösse	Beobachter	Anfang		Ende		Anfang		Ende	
						A	H	A	H	AR.	Decl.	AR.	Decl.
	h	m	s			°	°	°	°	°	°	°	°
6	7	40	19	5		244.9	44.4	253.0	38.0	82.6	+46.2	85.4	+37.5
7		48	44	1		341.4	63.6	332.4	57.4	24.0	+22.2	30.2	+18.0
8		56	14	3		232.9	18.9	236 2	8.9	122.6	+38.4	127.4	+28.5
9	7	59	29	2		189.5	40.1	265.4	35.7	154.7	+79.3	84.7	+28.4
10	8	5	24	4		192.5	21.9	198.7	12.1	173.9	+61.5	169 7	+49.5
11		32	54	3		270.7	40.1	278.5	24.2	86.6	+28.2	93.8	+11.5
12		34	29	2		295.5	27.3	287.6	11.4	80.2	+ 4.7	95 2	— 2.6
13		41	59	3		285.9	59.3	306.2	17.0	63 8	+33.3	79.8	— 9.1
14		42	14	3		312.4	51.1	282.4	44.0	57.9	+17.3	79.1	+24.5
15	8	58	14	4		325.0	34.8	329.5	23.4	61.2	— 1.4	61.2	—13.3
16	9	2	54	1		225.2	68.8	254.3	39.1	63.8	+60.0	104.3	+37.6
17		17	9	3		218.2	39.1	201.4	32.3	131.4	+61 2	164.4	+67.2
18		19	59	4		235.1	63.3	225.4	50.4	80.6	+57.1	106.6	+60.8
19	9	45	54	2		265.2	69.6	272.4	41.7	60.1	+46.5	103.1	+28.3

1870. December 13. Kremsmünster.

Beobachter: Prof. Dr. Strasser.

Nr.	h	m	s	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	6	41	28	1*		191.2	57.8	249.4	44.1	33.6	+78.4	67.8	+43.4
2		42	28	4		277.5	19.7	284.9	18.1	71.6	+ 9.7	67.6	+ 3.9
3		45	3	3		273.2	57.4	291.9	52.1	43.7	+37.4	40.5	+25.8
4		47	58	3		348.0	61.5	3.2	44.8	8.0	+19.7	359.7	+ 3.1
5	6	53	58	4		156.3	67.3	173.5	62.9	341.2	+67.4	356.0	+74 9
6	7	6	28	5		220.0	27.0	248.0	20.6	116.3	+52.5	98.4	+29.7
7		8	58	5		294.2	31.8	287.7	24.7	59.0	+ 9.2	67.7	+ 7.4
8		20	28	4		31.5	28.8	110.2	12.4	342.6	— 8.1	273.6	+22 9
9		21	58	4		117.4	49 7	115.4	43.7	307.2	+50.1	300.0	+46.2
10		23	43	3		295 9	43.8	309.0	23.8	53.9	+17.8	56.2	— 5.5
11		32	43	2		181.9	49.7	227.6	35 7	49.2	+88.6	104 9	+53.0
12		50	38	3		207.0	62.9	245.4	51.6	53.2	+69.0	77.9	+49.1
13		51	13	3		219.2	23.6	227.4	21.7	132.1	+50.4	125.6	+43.1
14	7	55	43	4		125.0	63.7	200.0	30.7	337.7	+57.2	150.7	+66.9
15	8	42	58	3		128 7	43.8	137.4	30.7	313.5	+54.2	297.8	+57.5
16	9	12	44	3		170.4	45.6	190.3	36.8	279.5	+82.5	177.3	+75.4

1870. December 31. Wien.

Beobachter: Assistent Schulhof.

Nr.	h	m	s	Grösse	Beobachter	A	H	A	H	AR.	Decl.	AR.	Decl.
1	14	30		2*		.	.	.	.	192	+57	222	+74
2	14	40		4		.	.	.	.	192	+39	206	+50

TAFEL

ZUR

VERWANDLUNG VON AZIMUTH UND HÖHE

IN

STUNDENWINKEL UND DECLINATION.

Berechnet für die Polhöhe von Wien

$\varphi = 48^\circ\ 12.'6.$

°	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	°
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	360
1	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.2	1.2	359
2	2.7	2.7	2.6	2.6	2.6	2.6	2.5	2.5	2.4	2.4	2.4	358
3	4.1	4.0	3.9	3.9	3.9	3.8	3.7	3.7	3.6	3.6	3.6	357
4	5.4	5.3	5.2	5.2	5.1	5.0	4.9	4.9	4.8	4.8	4.7	356
5	6.8	6.7	6.5	6.4	6.4	6.3	6.2	6.1	6.0	6.0	5.9	355
6	8.1	8.0	7.8	7.7	7.6	7.5	7.4	7.3	7.2	7.1	7.0	354
7	9.4	9.2	9.1	9.0	8.9	8.8	8.6	8.5	8.4	8.3	8.1	353
8	10.7	10.6	10.4	10.3	10.1	10.0	9.8	9.7	9.5	9.4	9.2	352
9	12.0	11.9	11.7	11.6	11.4	11.2	11.0	10.9	10.7	10.6	10.4	351
10	13.3	13.1	12.9	12.8	12.6	12.4	12.2	12.1	11.9	11.7	11.5	350
11	14.6	14.4	14.2	14.0	13.8	13.6	13.4	13.3	13.1	12.9	12.7	349
12	15.9	15.7	15.4	15.2	15.0	14.8	14.6	14.4	14.2	14.0	13.8	348
13	17.2	17.0	16.7	16.5	16.3	16.1	15.8	15.6	15.4	15.2	15.0	347
14	18.5	18.3	18.0	17.8	17.5	17.3	17.0	16.8	16.5	16.3	16.1	346
15	19.8	19.6	19.3	19.0	18.7	18.5	18.2	18.0	17.7	17.5	17.2	345
16	21.0	20.8	20.5	20.2	19.9	19.7	19.4	19.1	18.8	18.6	18.3	344
17	22.3	22.0	21.7	21.4	21.1	20.9	20.6	20.3	20.0	19.7	19.4	343
18	23.5	23.2	22.9	22.6	22.3	22.0	21.7	21.4	21.1	20.8	20.5	342
19	24.8	24.5	24.1	23.8	23.5	23.2	22.9	22.6	22.2	21.9	21.6	341
20	26.0	25.7	25.3	25.0	24.6	24.3	24.0	23.7	23.3	23.0	22.7	340
21	27.2	26.9	26.5	26.2	25.8	25.4	25.1	24.8	24.4	24.1	23.8	339
22	28.4	28.1	27.7	27.3	26.9	26.6	26.2	25.9	25.5	25.2	24.9	338
23	29.6	29.3	28.9	28.5	28.1	27.7	27.3	27.0	26.6	26.3	26.0	337
24	30.8	30.4	30.0	29.6	29.2	28.8	28.4	28.1	27.7	27.4	27.0	336
25	32.0	31.6	31.2	30.8	30.4	30.0	29.6	29.2	28.8	28.5	28.1	335
26	33.2	32.8	32.3	31.9	31.5	31.1	30.7	30.3	29.9	29.5	29.1	334
27	34.4	34.0	33.5	33.1	32.6	32.2	31.8	31.4	31.0	30.6	30.2	333
28	35.5	35.1	34.6	34.2	33.7	33.3	32.9	32.5	32.0	31.6	31.2	332
29	36.7	36.2	35.7	35.3	34.8	34.4	34.0	33.5	33.1	32.6	32.2	331
30	37.8	37.3	36.8	36.3	35.9	35.4	35.0	34.5	34.1	33.6	33.2	330
31	38.9	38.4	37.9	37.4	37.0	36.5	36.0	35.5	35.1	34.6	34.2	329
32	40.0	39.5	39.0	38.5	38.0	37.5	37.0	36.5	36.1	35.6	35.2	328
33	41.1	40.6	40.1	39.6	39.1	38.6	38.1	37.6	37.1	36.6	36.2	327
34	42.2	41.6	41.1	40.6	40.1	39.6	39.1	38.6	38.1	37.6	37.2	326
35	43.3	42.7	42.2	41.6	41.1	40.6	40.1	39.6	39.1	38.6	38.2	325
36	44.3	43.7	43.2	42.6	42.1	41.6	41.1	40.6	40.1	39.6	39.2	324
37	45.4	44.8	44.2	43.6	43.1	42.6	42.1	41.6	41.1	40.6	40.2	323
38	46.4	45.8	45.2	44.6	44.1	43.6	43.1	42.6	42.1	41.5	41.1	322
39	47.4	46.8	46.2	45.6	45.1	44.6	44.1	43.6	43.1	42.6	42.1	321
40	48.4	47.8	47.2	46.6	46.1	45.6	45.1	44.5	44.0	43.5	43.0	320
41	49.4	48.8	48.2	47.6	47.1	46.6	46.1	45.5	45.0	44.5	44.0	319
42	50.4	49.8	49.2	48.6	48.1	47.5	47.0	46.4	45.9	45.4	44.9	318
43	51.4	50.8	50.2	49.6	49.1	48.5	48.0	47.4	46.9	46.4	45.9	317
44	52.3	51.7	51.2	50.6	50.0	49.4	48.9	48.3	47.8	47.3	46.8	316
45	53.3	52.7	52.2	51.6	51.0	50.3	49.7	49.2	48.7	48.2	47.7	315
°	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	°

h	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	h
°	°	°	°	°	°	°	°	°	°	°	°	°
0	-41.8	-40.8	-39.8	-38.8	-37.8	-36.8	-35.8	-34.8	-33.8	-32.8	-31.8	360
1	-41.8	-40.8	-39.8	-38.8	-37.8	-36.8	-35.8	-34.8	-33.8	-32.8	-31.8	359
2	-41.8	-40.8	-39.8	-38.8	-37.8	-36.8	-35.8	-34.8	-33.8	-32.8	-31.8	358
3	-41.8	-40.8	-39.8	-38.8	-37.8	-36.8	-35.8	-34.8	-33.8	-32.8	-31.8	357
4	-41.7	-40.7	-39.7	-38.7	-37.7	-36.7	-35.7	-34.7	-33.7	-32.7	-31.7	356
5	-41.6	-40.6	-39.6	-38.6	-37.6	-36.6	-35.6	-34.6	-33.6	-32.7	-31.7	355
6	-41.5	-40.5	-39.5	-38.5	-37.5	-36.5	-35.5	-34.5	-33.5	-32.6	-31.6	354
7	-41.4	-40.4	-39.4	-38.4	-37.4	-36.4	-35.4	-34.4	-33.4	-32.5	-31.5	353
8	-41.3	-40.3	-39.3	-38.3	-37.3	-36.3	-35.3	-34.3	-33.3	-32.4	-31.4	352
9	-41.2	-40.2	-39.2	-38.2	-37.2	-36.2	-35.2	-34.2	-33.2	-32.3	-31.3	351
10	-41.0	-40.0	-39.0	-38.0	-37.0	-36.0	-35.0	-34.1	-33.1	-32.1	-31.1	350
11	-40.9	-39.9	-38.9	-37.9	-36.9	-35.9	-34.9	-34.0	-33.0	-32.0	-31.0	349
12	-40.7	-39.7	-38.7	-37.7	-36.7	-35.7	-34.7	-33.8	-32.8	-31.8	-30.8	348
13	-40.5	-39.5	-38.5	-37.5	-36.5	-35.5	-34.5	-33.6	-32.6	-31.6	-30.6	347
14	-40.3	-39.3	-38.3	-37.3	-36.3	-35.3	-34.3	-33.4	-32.4	-31.4	-30.4	346
15	-40.1	-39.1	-38.1	-37.1	-36.1	-35.1	-34.1	-33.2	-32.2	-31.2	-30.2	345
16	-39.8	-38.8	-37.8	-36.9	-35.9	-34.9	-33.9	-33.0	-32.0	-31.0	-30.0	344
17	-39.6	-38.6	-37.6	-36.7	-35.-	-34.7	-33.7	-32.8	-31.8	-30.8	-29.8	343
18	-39.3	-38.3	-37.3	-36.4	-35.4	-34.5	-33.5	-32.6	-31.6	-30.6	-29.6	342
19	-39.1	-38.1	-37.1	-36.2	-35.2	-34.3	-33.3	-32.4	-31.4	-30.4	-29.4	341
20	38.8	-37.8	-36.8	-35.9	-34.9	-34.0	-33.0	-32.1	-31.1	-30.1	-29.1	340
21	-38.5	-37.5	-36.5	-35.6	-34.6	-33.7	-32.7	-31.8	-30.8	-29.9	-28.9	339
22	-38.2	-37.2	-36.2	-35.3	-34.3	-33.4	-32.4	-31.5	-30.5	-29.6	-28.6	338
23	-37.9	-26.9	-35.9	-35.0	-34.0	-33.1	-32.1	-31.2	-30.2	-29.3	-28.3	337
24	-37.5	-36.5	-35.6	-34.7	-33.7	-32.8	-31.8	-30.9	-29.9	-29.0	-28.0	336
25	-37.2	-36.2	-35.3	-34.4	-33.4	-32.5	-31.5	-30.6	-29.6	-28.7	-27.7	335
26	-36.8	-35.8	-34.9	-34.0	-33.0	-32.1	-31.2	-30.3	-29.3	-28.4	-27.4	334
27	-36.4	-35.5	-34.6	-33.7	-32.7	-31.8	-30.9	-30.0	-29.0	-28.1	-27.1	333
28	-36.0	-35.1	-34.2	-33.3	-32.3	-31.4	-30.5	-29.6	-28.6	-27.7	-26.8	332
29	-35.6	-34.7	-33.8	-32.9	-32.0	-31.1	-30.2	-29.3	-28.3	-27.4	-26.4	331
30	-35.2	-34.3	-33.4	-32.5	-31.6	-30.7	-29.8	-28.9	-27.9	-27.0	-26.0	330
31	-34.8	-33.9	-33.0	-32.1	-31.2	-30.3	-29.4	-28.5	-27.5	-26.6	-25.6	329
32	-34.4	-33.5	-32.6	-31.7	-30.8	-29.9	-29.0	-28.1	-27.1	-26.2	-25.2	328
33	-34.0	-33.1	-32.2	-31.3	-30.4	-29.5	-28.6	-27.7	-26.7	-25.8	-24.9	327
34	-33.5	-32.6	-31.7	-30.9	-30.0	-29.1	-28.2	-27.3	-26.3	-25.4	-24.5	326
35	-33.1	-32.2	-31.3	-30.5	-29.6	-28.7	-27.8	-26.9	-25.9	-25.0	-24.1	325
36	-32.6	-31.7	-30.8	-30.0	-29.1	-28.2	-27.3	-26.4	-25.5	-24.6	-23.7	324
37	-32.2	-31.3	-30.4	-29.6	-28.7	-27.8	-26.9	-26.0	-25.1	-24.2	-23.3	323
38	-31.7	-30.8	-29.9	-29.1	-28.2	-27.3	-26.4	-25.5	-24.6	-23.7	-22.8	322
39	-31.2	-30.3	-29.4	-28.6	-27.7	-26.9	-26.0	-25.1	-24.2	-23.3	-22.4	321
40	-30.7	-29.8	-28.9	-28.1	-27.2	-26.4	-25.5	-24.6	-23.7	-22.8	-21.9	320
41	-30.2	-29.3	-28.4	-27.6	-26.7	-25.9	-25.0	-24.2	-23.3	-22.4	-21.5	319
42	-29.7	-28.8	-27.9	-27.1	-26.2	-25.4	-24.5	-23.7	-22.8	-21.9	-21.0	318
43	-29.2	-28.3	-27.4	-26.6	-25.7	-24.9	-24.0	-23.2	-22.3	-21.5	-20.6	317
44	-28.6	-27.8	-26.9	-26.1	-25.2	-24.4	-23.5	-22.7	-21.8	-21.0	-20.1	316
45	-28.1	-27.2	-26.4	-25.5	-24.7	-23.8	-23.0	-22.1	-21.3	-20.4	-19.6	315
h	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	h

a \ h	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	360
1	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.0	359
2	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.0	358
3	3.6	3.5	3.4	3.4	3.3	3.3	3.3	3.2	3.1	3.1	3.0	357
4	4.7	4.6	4.5	4.5	4.4	4.4	4.3	4.2	4.1	4.1	4.0	356
5	5.9	5.8	5.7	5.6	5.5	5.5	5.4	5.3	5.2	5.2	5.1	355
6	7.0	6.9	6.8	6.7	6.6	6.5	6.4	6.3	6.2	6.2	6.1	354
7	8.1	8.0	7.9	7.8	7.7	7.6	7.5	7.4	7.3	7.2	7.1	353
8	9.2	9.1	9.0	8.9	8.7	8.6	8.5	8.4	8.3	8.2	8.1	352
9	10.4	10.3	10.1	10.0	9.8	9.7	9.6	9.5	9.3	9.2	9.1	351
10	11.5	11.4	11.2	11.1	10.9	10.8	10.6	10.5	10.3	10.2	10.1	350
11	12.7	12.5	12.3	12.2	12.0	11.9	11.7	11.6	11.5	11.3	11.1	349
12	13.8	13.6	13.4	13.2	13.0	12.9	12.7	12.6	12.4	12.3	12.1	348
13	15.0	14.8	14.5	14.3	14.1	14.0	13.8	13.7	13.5	13.3	13.1	347
14	16.1	15.9	15.6	15.4	15.2	15.0	14.8	14.7	14.5	14.3	14.1	346
15	17.2	17.0	16.7	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.1	345
16	18.3	18.1	17.8	17.6	17.4	17.2	16.9	16.7	16.5	16.3	16.0	344
17	19.4	19.2	18.9	18.7	18.5	18.3	18.0	17.8	17.5	17.3	17.0	343
18	20.5	20.3	20.0	19.8	19.5	19.3	19.0	18.8	18.5	18.3	18.0	342
19	21.6	21.4	21.1	20.9	20.6	20.3	20.0	19.8	19.5	19.3	19.0	341
20	22.7	22.4	22.1	21.9	21.6	21.3	21.0	20.8	20.5	20.2	19.9	340
21	23.8	23.5	23.2	22.9	22.6	22.3	22.0	21.8	21.5	21.2	20.9	339
22	24.9	24.6	24.2	23.9	23.6	23.3	23.0	22.8	22.5	22.2	21.9	338
23	26.0	25.7	25.3	25.0	24.7	24.4	24.0	23.8	23.5	23.2	22.9	337
24	27.0	26.7	26.3	26.0	25.7	25.4	25.0	24.7	24.4	24.1	23.8	336
25	28.1	27.8	27.4	27.1	26.7	26.4	26.0	25.7	25.4	25.1	24.8	335
26	29.1	28.8	28.4	28.1	27.7	27.4	27.0	26.7	26.3	26.0	25.7	334
27	30.2	29.8	29.4	29.1	28.7	28.4	28.0	27.7	27.3	27.0	26.6	333
28	31.2	30.8	30.4	30.1	29.7	29.3	28.9	28.6	28.2	27.9	27.5	332
29	32.2	31.8	31.4	31.0	30.7	30.3	29.9	29.5	29.2	28.8	28.5	331
30	33.2	32.8	32.4	32.0	31.7	31.3	30.9	30.5	30.1	29.7	29.4	330
31	34.2	33.8	33.4	33.0	32.7	32.3	31.9	31.5	31.1	30.7	30.3	329
32	35.2	34.8	34.4	34.0	33.6	33.2	32.8	32.4	32.0	31.6	31.2	328
33	36.2	35.8	35.4	35.0	34.6	34.2	33.8	33.4	33.0	32.5	32.1	327
34	37.2	36.8	36.4	35.9	35.5	35.1	34.7	34.3	33.9	33.4	33.0	326
35	38.2	37.8	37.4	36.9	36.5	36.0	35.6	35.2	34.8	34.3	33.9	325
36	39.2	38.7	38.3	37.8	37.4	36.9	36.5	36.1	35.7	35.2	34.8	324
37	40.2	39.7	39.3	38.8	38.3	37.8	37.4	37.0	36.6	36.1	35.7	323
38	41.1	40.6	40.2	39.7	39.2	38.7	38.3	37.9	37.5	37.0	36.6	322
39	42.1	41.6	41.1	40.6	40.2	39.7	39.2	38.8	38.4	37.9	37.5	321
40	43.0	42.5	42.0	41.5	41.1	40.6	40.1	39.6	39.2	38.7	38.3	320
41	44.0	43.5	43.0	42.5	42.0	41.5	41.0	40.5	40.1	39.6	39.2	319
42	44.9	44.4	43.9	43.4	42.9	42.4	41.9	41.4	41.0	40.5	40.0	318
43	45.9	45.3	44.8	44.3	43.8	43.3	42.8	42.3	41.9	41.4	40.9	317
44	46.8	46.2	45.7	45.2	44.7	44.2	43.7	43.2	42.7	42.2	41.7	316
45	47.7	47.1	46.6	46.1	45.6	45.1	44.6	44.1	43.6	43.1	42.6	315
a \ h	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	h \ a

a \ h	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
0	−31.8	−30.8	−29.8	−28.8	−27.8	−26.8	−25.8	−24.8	−23.8	−22.8	−21.8	360
1	−31.8	−30.8	−29.8	−28.8	−27.8	−26.8	−25.8	−24.8	−23.8	−22.8	−21.8	359
2	−31.8	−30.8	−29.8	−28.8	−27.8	−26.8	−25.8	−24.8	−23.8	−22.8	−21.8	358
3	−31.8	−30.8	−29.8	−28.8	−27.8	−26.8	−25.8	−24.8	−23.8	−22.8	−21.8	357
4	−31.7	−30.7	−29.7	−28.7	−27.7	−26.7	−25.7	−24.7	−23.7	−22.7	−21.7	356
5	−31.7	−30.7	−29.7	−28.7	−27.7	−26.7	−25.7	−24.7	−23.7	−22.7	−21.7	355
6	−31.6	−30.6	−29.6	−28.6	−27.6	−26.6	−25.6	−24.6	−23.6	−22.6	−21.6	354
7	−31.5	−30.5	−29.5	−28.5	−27.5	−26.5	−25.5	−24.5	−23.5	−22.5	−21.5	353
8	−31.4	−30.4	−29.4	−28.4	−27.4	−26.4	−25.4	−24.4	−23.4	−22.4	−21.4	352
9	−31.3	−30.3	−29.3	−28.3	−27.3	−26.3	−25.3	−24.3	−23.3	−22.3	−21.3	351
10	−31.1	−30.1	−29.1	−28.1	−27.1	−26.2	−25.2	−24.2	−23.2	−22.2	−21.2	350
11	−31.0	−30.0	−29.0	−28.0	−27.0	−26.1	−25.1	−24.1	−23.1	−22.1	−21.1	349
12	−30.8	−29.8	−28.8	−27.8	−26.8	−25.9	−24.9	−23.9	−22.9	−21.9	−20.9	348
13	−30.6	−29.7	−28.7	−27.7	−26.7	−25.8	−24.8	−23.8	−22.8	−21.8	−20.8	347
14	−30.4	−29.5	−28.5	−27.5	−26.5	−25.6	−24.6	−23.6	−22.6	−21.6	−20.6	346
15	−30.2	−29.3	−28.3	−27.3	−26.3	−25.4	−24.4	−23.4	−22.4	−21.5	−20.5	345
16	−30.0	−29.1	−28.1	−27.1	−26.1	−25.2	−24.2	−23.2	−22.2	−21.3	−20.3	344
17	−29.8	−28.9	−27.9	−26.9	−25.9	−25.0	−24.0	−23.0	−22.0	−21.1	−20.1	343
18	−29.6	−28.7	−27.7	−26.7	−25.7	−24.8	−23.8	−22.8	−21.8	−20.9	−19.9	342
19	−29.4	−28.5	−27.5	−26.5	−25.5	−24.6	−23.6	−22.6	−21.6	−20.7	−19.7	341
20	−29.1	−28.2	−27.2	−26.3	−25.3	−24.4	−23.4	−22.4	−21.4	−20.5	−19.5	340
21	−28.9	−28.0	−27.0	−26.1	−25.1	−24.2	−23.2	−22.2	−21.2	−20.3	−19.3	339
22	−28.6	−27.7	−26.7	−25.8	−24.8	−23.9	−22.9	−21.9	−20.9	−20.0	−19.0	338
23	−28.3	−27.4	−26.4	−25.5	−24.5	−23.6	−22.6	−21.7	−20.7	−19.8	−18.8	337
24	−28.0	−27.1	−26.1	−25.2	−24.2	−23.3	−22.3	−21.4	−20.4	−19.5	−18.5	336
25	−27.7	−26.8	−25.8	−24.9	−23.9	−23.0	−22.0	−21.1	−20.1	−19.2	−18.2	335
26	−27.4	−26.5	−25.5	−24.6	−23.6	−22.7	−21.7	−20.8	−19.8	−18.9	−17.9	334
27	−27.1	−26.2	−25.2	−24.3	−23.3	−22.4	−21.4	−20.5	−19.5	−18.6	−17.6	333
28	−26.8	−25.9	−24.9	−24.0	−23.0	−22.1	−21.1	−20.2	−19.2	−18.3	−17.3	332
29	−26.4	−25.5	−24.6	−23.6	−22.7	−21.8	−20.8	−19.9	−18.9	−18.0	−17.0	331
30	−26.0	−25.1	−24.2	−23.3	−22.3	−21.4	−20.4	−19.5	−18.5	−17.6	−16.7	330
31	−25.6	−24.7	−23.8	−22.9	−21.9	−21.0	−20.1	−19.2	−18.2	−17.3	−16.4	329
32	−25.2	−24.3	−23.4	−22.5	−21.5	−20.6	−19.7	−18.8	−17.8	−16.9	−16.0	328
33	−24.9	−24.0	−23.1	−22.2	−21.2	−20.3	−19.4	−18.5	−17.5	−16.6	−15.6	327
34	−24.5	−23.6	−22.7	−21.8	−20.8	−19.9	−19.0	−18.1	−17.1	−16.2	−15.3	326
35	−24.1	−23.2	−22.3	−21.4	−20.4	−19.5	−18.6	−17.7	−16.8	−15.9	−15.0	325
36	−23.7	−22.8	−21.9	−21.0	−20.0	−19.1	−18.2	−17.3	−16.4	−15.5	−14.6	324
37	−23.3	−22.4	−21.5	−20.6	−19.6	−18.7	−17.8	−16.9	−16.0	−15.1	−14.2	323
38	−22.8	−22.0	−21.1	−20.2	−19.2	−18.3	−17.4	−16.5	−15.6	−14.7	−13.8	322
39	−22.4	−21.6	−20.7	−19.8	−18.8	−17.9	−17.0	−16.1	−15.2	−14.3	−13.4	321
40	−21.9	−21.1	−20.2	−19.3	−18.4	−17.5	−16.6	−15.7	−14.7	−13.8	−12.9	320
41	−21.5	−20.7	−19.8	−18.9	−18.0	−17.1	−16.2	−15.3	−14.3	−13.4	−12.5	319
42	−21.0	−20.2	−19.3	−18.4	−17.5	−16.6	−15.7	−14.8	−13.9	−13.0	−12.1	318
43	−20.6	−19.7	−18.8	−17.9	−17.0	−16.2	−15.3	−14.4	−13.5	−12.6	−11.7	317
44	−20.1	−19.2	−18.3	−17.4	−16.5	−15.7	−14.8	−13.9	−13.0	−12.1	−11.2	316
45	−19.6	−18.7	−17.8	−16.9	−16.0	−15.1	−14.3	−13.4	−12.5	−11.6	−10.7	315
a \ h	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	h \ a

h / a	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	360
1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	359
2	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	358
3	3.0	3.0	3.0	3.0	2.9	2.9	2.8	2.8	2.7	2.7	2.7	357
4	4.0	4.0	3.9	3.9	3.8	3.8	3.7	3.7	3.6	3.6	3.5	356
5	5.1	5.0	4.9	4.9	4.8	4.8	4.7	4.7	4.6	4.5	4.4	355
6	6.1	6.0	5.9	5.9	5.8	5.7	5.6	5.6	5.5	5.4	5.3	354
7	7.1	7.0	6.9	6.9	6.8	6.7	6.6	6.5	6.4	6.3	6.2	353
8	8.1	8.0	7.9	7.8	7.7	7.6	7.5	7.4	7.3	7.2	7.1	352
9	9.1	9.0	8.9	8.8	8.7	8.6	8.4	8.3	8.2	8.1	8.0	351
10	10.1	10.0	9.8	9.7	9.6	9.5	9.3	9.2	9.1	9.0	8.8	350
11	11.1	11.0	10.8	10.7	10.6	10.5	10.3	10.2	10.0	9.9	9.7	349
12	12.1	12.0	11.8	11.7	11.5	11.4	11.2	11.1	10.9	10.8	10.6	348
13	13.1	13.0	12.8	12.7	12.5	12.3	12.1	12.0	11.8	11.7	11.5	347
14	14.1	13.9	13.7	13.6	13.4	13.2	13.0	12.9	12.7	12.6	12.4	346
15	15.1	14.9	14.7	14.5	14.3	14.1	13.9	13.8	13.6	13.5	13.3	345
16	16.0	15.8	15.6	15.4	15.2	15.0	14.8	14.6	14.4	14.3	14.1	344
17	17.0	16.8	16.6	16.4	16.2	16.0	15.8	15.6	15.3	15.2	15.0	343
18	18.0	17.8	17.6	17.4	17.1	16.9	16.7	16.5	16.2	16.0	15.8	342
19	19.0	18.8	18.5	18.3	18.0	17.8	17.6	17.4	17.1	16.9	16.7	341
20	19.9	19.7	19.4	19.2	18.9	18.7	18.5	18.3	18.0	17.8	17.5	340
21	20.9	20.7	20.4	20.2	19.9	19.7	19.4	19.2	18.9	18.7	18.4	339
22	21.9	21.6	21.3	21.1	20.8	20.6	20.3	20.0	19.7	19.5	19.2	338
23	22.9	22.6	22.3	22.0	21.7	21.5	21.2	20.9	20.6	20.4	20.1	337
24	23.8	23.5	23.2	22.9	22.6	22.3	22.0	21.7	21.4	21.2	20.9	336
25	24.8	24.5	24.2	23.9	23.5	23.2	22.9	22.6	22.3	22.1	21.8	335
26	25.7	25.4	25.1	24.8	24.4	24.1	23.8	23.5	23.2	22.9	22.6	334
27	26.6	26.3	26.0	25.7	25.3	25.0	24.7	24.4	24.1	23.8	23.5	333
28	27.5	27.2	26.9	26.6	26.2	25.9	25.6	25.3	24.9	24.6	24.3	332
29	28.5	28.1	27.8	27.4	27.1	26.8	26.5	26.1	25.8	25.4	25.1	331
30	29.4	29.0	28.7	28.3	28.0	27.6	27.3	26.9	26.6	26.2	25.9	330
31	30.3	29.9	29.6	29.2	28.9	28.5	28.2	27.8	27.4	27.0	26.7	329
32	31.2	30.8	30.4	30.0	29.7	29.3	29.0	28.6	28.2	27.8	27.5	328
33	32.1	31.7	31.3	30.9	30.6	30.2	29.9	29.5	29.1	28.7	28.4	327
34	33.0	32.6	32.2	31.8	31.5	31.1	30.7	30.3	29.9	29.5	29.2	326
35	33.9	33.5	33.1	32.7	32.4	32.0	31.6	31.1	30.7	30.3	30.0	325
36	34.8	34.4	34.0	33.6	33.2	32.8	32.4	31.9	31.5	31.1	30.8	324
37	35.7	35.3	34.9	34.5	34.1	33.7	33.3	32.8	32.4	32.0	31.6	323
38	36.6	36.1	35.7	35.3	34.9	34.5	34.1	33.6	33.2	32.8	32.4	322
39	37.5	37.0	36.6	36.1	35.7	35.3	34.9	34.4	34.0	33.6	33.2	321
40	38.3	37.8	37.4	36.9	36.5	36.1	35.7	35.2	34.8	34.4	34.0	320
41	39.2	38.7	38.3	37.8	37.4	36.9	36.5	36.0	35.6	35.2	34.8	319
42	40.0	39.5	39.1	38.6	38.2	37.7	37.3	36.8	36.4	35.9	35.5	318
43	40.9	40.4	39.9	39.4	39.0	38.5	38.1	37.6	37.2	36.7	36.3	317
44	41.7	41.2	40.7	40.2	39.8	39.3	38.9	38.4	38.0	37.5	37.1	316
45	42.6	42.1	41.6	41.1	40.6	40.1	39.7	39.2	38.8	38.3	37.9	315
a / h	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	a / h

a \ h	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
0	−21.8	−20.8	−19.8	−18.8	−17.8	−16.8	−15.8	−14.8	−13.8	−12.8	−11.8	360
1	−21.8	−20.8	−19.8	−18.8	−17.8	−16.8	−15.8	−14.8	−13.8	−12.8	−11.8	359
2	−21.8	−20.8	−19.8	−18.8	−17.8	−16.8	−15.8	−14.8	−13.8	−12.8	−11.8	358
3	−21.8	−20.8	−19.8	−18.8	−17.8	−16.8	−15.8	−14.8	−13.8	−12.8	−11.8	357
4	−21.7	−20.7	−19.7	−18.7	−17.7	−16.7	−15.7	−14.7	−13.7	−12.7	−11.7	356
5	−21.7	−20.7	−19.7	−18.7	−17.7	−16.7	−15.7	−14.7	−13.7	−12.7	−11.7	355
6	−21.6	−20.6	−19.6	−18.6	−17.6	−16.6	−15.6	−14.6	−13.6	−12.6	−11.6	354
7	−21.5	−20.5	−19.5	−18.5	−17.5	−16.5	−15.5	−14.5	−13.6	−12.6	−11.6	353
8	−21.4	−20.4	−19.4	−18.4	−17.4	−16.4	−15.4	−14.4	−13.5	−12.5	−11.5	352
9	−21.3	−20.3	−19.3	−18.3	−17.3	−16.3	−15.3	−14.3	−13.4	−12.4	−11.4	351
10	−21.2	−20.2	−19.2	−18.2	−17.2	−16.2	−15.2	−14.2	−13.3	−12.3	−11.3	350
11	−21.1	−20.1	−19.1	−18.1	−17.1	−16.1	−15.1	−14.1	−13.2	−12.2	−11.2	349
12	−20.9	−19.9	−18.9	−18.0	−17.0	−16.0	−15.0	−14.0	−13.0	−12.0	−11.0	348
13	−20.8	−19.8	−18.8	−17.9	−16.9	−15.9	−14.9	−13.9	−12.9	−11.9	−10.9	347
14	−20.6	−19.6	−18.6	−17.7	−16.7	−15.7	−14.7	−13.7	−12.8	−11.8	−10.8	346
15	−20.5	−19.5	−18.5	−17.6	−16.6	−15.6	−14.6	−13.6	−12.7	−11.7	−10.7	345
16	−20.3	−19.3	−18.3	−17.4	−16.4	−15.4	−14.4	−13.4	−12.5	−11.5	−10.5	344
17	−20.1	−19.1	−18.1	−17.2	−16.2	−15.2	−14.2	−13.2	−12.3	−11.3	−10.3	343
18	−19.9	−18.9	−17.9	−17.0	−16.0	−15.0	−14.0	−13.0	−12.1	−11.1	−10.1	342
19	−19.7	−18.7	−17.7	−16.8	−15.8	−14.8	−13.8	−12.8	−11.9	−10.9	− 9.9	341
20	−19.5	−18.5	−17.5	−16.6	−15.6	−14.6	−13.6	−12.6	−11.7	−10.7	− 9.7	340
21	−19.3	−18.3	−17.3	−16.4	−15.4	−14.4	−13.4	−12.4	−11.5	−10.5	− 9.5	339
22	−19.0	−18.0	−17.0	−16.1	−15.1	−14.1	−13.1	−12.1	−11.2	−10.3	− 9.3	338
23	−18.8	−17.8	−16.8	−15.9	−14.9	−13.9	−12.9	−11.9	−11.0	−10.1	− 9.1	337
24	−18.5	−17.5	−16.5	−15.6	−14.6	−13.6	−12.6	−11.7	−10.7	− 9.8	− 8.8	336
25	−18.2	−17.3	−16.3	−15.4	−14.4	−13.4	−12.4	−11.5	−10.5	− 9.6	− 8.6	335
26	−17.9	−17.0	−16.0	−15.1	−14.1	−13.1	−12.1	−11.2	−10.2	− 9.3	− 8.3	334
27	−17.6	−16.7	−15.7	−14.8	−13.8	−12.9	−11.9	−11.0	−10.0	− 9.1	− 8.1	333
28	−17.3	−16.4	−15.4	−14.5	−13.5	−12.6	−11.6	−10.7	− 9.7	− 8.8	− 7.8	332
29	−17.0	−16.1	−15.1	−14.2	−13.2	−12.3	−11.3	−10.4	− 9.5	− 8.6	− 7.6	331
30	−16.7	−15.8	−14.8	−13.9	−12.9	−12.0	−11.0	−10.1	− 9.2	− 8.3	− 7.3	330
31	−16.4	−15.5	−14.5	−13.6	−12.6	−11.7	−10.7	− 9.8	− 8.9	− 8.0	− 7.0	329
32	−16.0	−15.1	−14.1	−13.2	−12.3	−11.4	−10.4	− 9.5	− 8.6	− 7.7	− 6.7	328
33	−15.6	−14.7	−13.8	−12.9	−12.0	−11.1	−10.1	− 9.2	− 8.3	− 7.3	− 6.3	327
34	−15.3	−14.4	−13.4	−12.5	−11.6	−10.7	− 9.7	− 8.8	− 7.9	− 7.0	− 6.0	326
35	−15.0	−14.1	−13.1	−12.2	−11.3	−10.4	− 9.4	− 8.5	− 7.6	− 6.7	− 5.7	325
36	−14.6	−13.7	−12.7	−11.8	−10.9	−10.0	− 9.0	− 8.1	− 7.2	− 6.3	− 5.4	324
37	−14.2	−13.3	−12.4	−11.5	−10.6	− 9.7	− 8.7	− 7.8	− 6.9	− 6.0	− 5.1	323
38	−13.8	−12.9	−12.0	−12.1	−10.2	− 9.3	− 8.3	− 7.4	− 6.5	− 5.6	− 4.7	322
39	−13.4	−12.5	−11.6	−10.7	− 9.8	− 8.9	− 8.0	− 7.1	− 6.2	− 5.3	− 4.4	321
40	−12.9	−12.1	−11.2	−10.3	− 9.4	− 8.5	− 7.6	− 6.7	− 5.8	− 4.9	− 4.8	320
41	−12.5	−11.7	−10.8	− 9.9	− 9.0	− 8.1	− 7.2	− 6.3	− 5.4	− 4.5	− 3.6	319
42	−12.1	−11.2	−10.3	− 9.5	− 8.6	− 7.7	− 6.8	− 5.9	− 5.0	− 4.1	− 3.2	318
43	−11.7	−10.8	− 9.9	− 9.1	− 8.2	− 7.3	− 6.4	− 5.5	− 4.6	− 3.7	− 2.8	317
44	−11.2	−10.3	− 9.4	− 8.6	− 7.7	− 6.8	− 5.9	− 5.1	− 4.2	− 3.3	− 2.4	316
45	−10.7	− 9.8	− 9.0	− 8.1	− 7.3	− 6.4	− 5.5	− 4.6	− 3.8	− 2.9	− 2.0	315
a \ h	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	h \ a

a \ h	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	360
1	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	359
2	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.6	1.6	1.6	1.6	358
3	2.7	2.6	2.6	2.5	2.5	2.5	2.5	2.4	2.4	2.4	2.4	357
4	3.5	3.4	3.4	3.3	3.3	3.3	3.3	3.2	3.2	3.1	3.1	356
5	4.4	4.3	4.3	4.2	4.2	4.1	4.1	4.0	4.0	3.9	3.9	355
6	5.3	5.2	5.2	5.1	5.0	4.9	4.9	4.8	4.7	4.6	4.6	354
7	6.2	6.2	6.1	6.0	5.9	5.8	5.7	5.6	5.5	5.4	5.4	353
8	7.1	7.0	6.9	6.8	6.7	6.6	6.5	6.4	6.3	6.2	6.1	352
9	8.0	7.9	7.8	7.6	7.5	7.4	7.3	7.2	7.1	7.0	6.9	351
10	8.8	8.7	8.6	8.5	8.3	8.2	8.1	8.0	7.9	7.8	7.7	350
11	9.7	9.6	9.5	9.4	9.2	9.0	8.9	8.8	8.7	8.6	8.5	349
12	10.6	10.4	10.3	10.1	10.0	9.8	9.7	9.5	9.4	9.3	9.2	348
13	11.5	11.3	11.2	11.1	10.9	10.7	10.5	10.3	10.2	10.1	10.0	347
14	12.4	12.2	12.0	11.9	11.7	11.5	11.3	11.1	11.0	10.8	10.7	346
15	13.3	13.1	12.9	12.7	12.5	12.3	12.1	11.9	11.8	11.6	11.5	345
16	14.1	13.9	13.7	13.5	13.3	13.1	12.9	12.7	12.6	12.4	12.2	344
17	15.0	14.8	14.6	14.4	14.2	14.0	13.7	13.5	13.4	13.2	13.0	343
18	15.8	15.6	15.4	15.2	15.0	14.8	14.5	14.3	14.1	13.9	13.7	342
19	16.7	16.5	16.2	16.0	15.8	15.6	15.3	15.1	14.9	14.7	14.5	341
20	17.5	17.3	17.0	16.8	16.6	16.4	16.1	15.9	15.7	15.4	15.2	340
21	18.4	18.2	17.9	17.7	17.4	17.2	16.9	16.7	16.5	16.2	16.0	339
22	19.2	19.0	18.7	18.5	18.2	18.0	17.7	17.4	17.2	16.9	16.7	338
23	20.1	19.8	19.5	19.3	19.0	18.8	18.5	18.2	18.0	17.7	17.5	357
24	20.9	20.6	20.3	20.1	19.8	19.5	19.2	18.9	18.7	18.4	18.2	336
25	21.8	21.5	21.2	20.9	20.6	20.3	20.0	19.7	19.5	19.2	19.0	335
26	22.6	22.3	22.0	21.7	21.4	21.1	20.8	20.5	20.2	19.9	19.7	334
27	23.5	23.2	22.8	22.5	22.2	21.9	21.6	21.3	21.0	20.7	20.4	333
28	24.3	24.0	23.6	23.3	23.0	22.7	22.3	22.0	21.7	21.4	21.1	332
29	25.1	24.8	24.4	24.1	23.8	23.5	23.1	22.8	22.5	22.2	21.9	331
30	25.9	25.6	25.2	24.9	24.6	24.3	23.9	23.5	23.2	22.9	22.6	330
31	26.7	26.4	26.0	25.7	25.4	25.1	24.7	24.3	24.0	23.6	23.3	329
32	27.5	27.2	26.8	26.5	26.1	25.8	25.4	25.0	24.7	24.3	24.0	328
33	28.4	28.0	27.6	27.3	26.9	26.6	26.2	25.8	25.5	25.1	24.7	327
34	29.1	28.8	28.4	28.1	27.7	27.3	26.9	26.5	26.2	25.8	25.4	326
35	30.0	29.6	29.2	28.9	28.5	28.1	27.7	27.3	26.9	26.5	26.1	325
36	30.8	30.4	30.0	29.6	29.2	28.8	28.4	28.0	27.6	27.2	26.8	324
37	31.6	31.2	30.8	30.4	30.0	29.6	29.2	28.8	28.4	27.9	27.5	323
38	32.4	32.0	31.6	31.2	30.7	30.3	29.9	29.5	29.1	28.6	28.2	322
39	33.2	32.8	32.4	32.0	31.5	31.1	30.6	30.2	29.8	29.3	28.9	321
40	34.0	33.6	33.1	32.7	32.2	31.8	31.3	30.9	30.5	30.0	29.6	320
41	34.8	34.4	33.9	33.5	33.0	32.6	32.1	31.6	31.2	30.7	30.3	319
42	35.5	35.1	34.6	34.2	33.7	33.3	32.8	32.3	31.9	31.4	31.0	318
43	36.3	35.9	35.4	35.0	34.5	34.0	33.5	33.0	32.6	32.1	31.7	317
44	37.1	36.6	36.1	35.7	35.2	34.7	34.2	33.7	33.3	32.8	32.4	316
45	37.9	37.4	36.9	36.5	36.0	35.5	35.0	34.5	34.0	33.5	33.1	315
a \ h	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	h \ a

a \ h	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
0	−11.8	−10.8	−9.8	−8.8	−7.8	−6.8	−5.8	−4.8	−3.8	−2.8	−1.8	360
1	−11.8	−10.8	−9.8	−8.8	−7.8	−6.8	−5.8	−4.8	−3.8	−2.8	−1.8	359
2	−11.8	−10.8	−9.8	−8.8	−7.8	−6.8	−5.8	−4.8	−3.8	−2.8	−1.8	358
3	−11.8	−10.8	−9.8	−8.8	−7.8	−6.8	−5.8	−4.8	−3.8	−2.8	−1.8	357
4	−11.7	−10.7	−9.7	−8.7	−7.7	−6.7	−5.7	−4.7	−3.7	−2.7	−1.7	356
5	−11.7	−10.7	−9.7	−8.7	−7.7	−6.7	−5.7	−4.7	−3.7	−2.7	−1.7	355
6	−11.6	−10.6	−9.6	−8.6	−7.6	−6.6	−5.6	−4.6	−3.6	−2.6	−1.6	354
7	−11.6	−10.6	−9.6	−8.6	−7.6	−6.6	−5.6	−4.6	−3.6	−2.6	−1.6	353
8	−11.5	−10.5	−9.5	−8.5	−7.5	−6.5	−5.5	−4.5	−3.5	−2.5	−1.5	352
9	−11.4	−10.4	−9.4	−8.4	−7.4	−6.4	−5.4	−4.4	−3.4	−2.4	−1.5	351
10	−11.3	−10.3	−9.3	−8.3	−7.3	−6.3	−5.3	−4.3	−3.3	−2.3	−1.4	350
11	−11.2	−10.2	−9.2	−8.2	−7.2	−6.2	−5.2	−4.2	−3.2	−2.2	−1.3	349
12	−11.0	−10.1	−9.1	−8.1	−7.1	−6.1	−5.1	−4.1	−3.1	−2.1	−1.2	348
13	−10.9	−9.9	−9.0	−8.0	−7.0	−6.0	−5.0	−4.0	−3.0	−2.0	−1.1	347
14	−10.8	−9.8	−8.8	−7.8	−6.8	−5.8	−4.9	−3.9	−2.9	−1.9	−1.0	346
15	−10.7	−9.7	−8.7	−7.7	−6.7	−5.7	−4.8	−3.8	−2.8	−1.8	−0.9	345
16	−10.5	−9.5	−8.5	−7.5	−6.5	−5.5	−4.6	−3.6	−2.6	−1.6	−0.7	344
17	−10.3	−9.3	−8.4	−7.4	−6.4	−5.4	−4.5	−3.5	−2.5	−1.5	−0.6	343
18	−10.1	−9.1	−8.2	−7.2	−6.2	−5.2	−4.3	−3.3	−2.3	−1.3	−0.4	342
19	−9.9	−8.9	−8.0	−7.0	−6.0	−5.0	−4.1	−3.1	−2.1	−1.1	−0.2	341
20	−9.7	−8.8	−7.8	−6.8	−5.8	−4.8	−3.9	−2.9	−1.9	−0.9	0.0	340
21	−9.5	−8.5	−7.6	−6.6	−5.6	−4.6	−3.7	−2.7	−1.7	−0.7	+0.2	339
22	−9.3	−8.3	−7.4	−6.4	−5.4	−4.4	−3.5	−2.5	−1.5	−0.5	+0.4	338
23	−9.1	−8.1	−7.2	−6.2	−5.2	−4.2	−3.3	−2.3	−1.3	−0.3	+0.6	337
24	−8.8	−7.8	−6.9	−5.9	−5.0	−4.0	−3.1	−2.1	−1.1	−0.1	+0.8	336
25	−8.6	−7.6	−6.7	−5.7	−4.8	−3.8	−2.9	−1.9	−0.9	+0.1	+1.0	335
26	−8.3	−7.3	−6.4	−5.5	−4.6	−3.6	−2.7	−1.7	−0.7	+0.3	+1.2	334
27	−8.1	−7.1	−6.2	−5.3	−4.4	−3.4	−2.5	−1.5	−0.5	+0.5	+1.4	333
28	−7.8	−6.8	−5.9	−5.0	−4.1	−3.1	−2.2	−1.2	−0.2	+0.8	+1.7	332
29	−7.6	−6.6	−5.7	−4.8	−3.9	−2.9	−2.0	−1.0	0.0	+1.0	+1.9	331
30	−7.3	−6.3	−5.4	−4.5	−3.6	−2.6	−1.7	−0.7	+0.3	+1.3	+2.2	330
31	−7.0	−6.0	−5.1	−4.2	−3.3	−2.3	−1.4	−0.4	+0.5	+1.5	+2.4	329
32	−6.7	−5.7	−4.8	−3.9	−3.0	−2.0	−1.1	−0.1	+0.8	+1.8	+2.7	328
33	−6.3	−5.4	−4.5	−3.6	−2.7	−1.7	−0.8	+0.1	+1.0	+2.0	+2.9	327
34	−6.0	−5.1	−4.2	−3.3	−2.4	−1.5	−0.5	+0.4	+1.3	+2.3	+3.2	326
35	−5.7	−4.8	−3.9	−3.0	−2.1	−1.2	−0.2	+0.7	+1.6	+2.6	+3.5	325
36	−5.4	−4.5	−3.6	−2.7	−1.8	−0.9	+0.1	+1.0	+1.9	+2.9	+3.8	324
37	−5.1	−4.2	−3.3	−2.4	−1.5	−0.6	+0.4	+1.3	+2.2	+3.2	+4.1	323
38	−4.7	−3.8	−2.9	−2.0	−1.1	−0.2	+0.7	+1.6	+2.5	+3.5	+4.4	322
39	−4.4	−3.5	−2.6	−1.7	−0.8	+0.1	+1.0	+1.9	+2.8	+3.8	+4.7	321
40	−4.0	−3.1	−2.2	−1.3	−0.4	+0.5	+1.4	+2.3	+3.2	+4.2	+5.1	320
41	−3.6	−2.7	−1.8	−0.9	0.0	+0.8	+1.7	+2.6	+3.5	+4.5	+5.4	319
42	−3.2	−2.3	−1.4	−0.5	+0.4	+1.2	+2.1	+3.0	+3.9	+4.8	+5.7	318
43	−2.8	−1.9	−1.0	−0.1	+0.8	+1.6	+2.5	+3.4	+4.3	+5.2	+6.0	317
44	−2.4	−1.5	−0.6	+0.3	+1.2	+2.0	+2.9	+3.8	+4.7	+5.6	+6.4	316
45	−2.0	−1.1	−0.2	+0.7	+1.6	+2.4	+3.3	+4.2	+5.0	+5.9	+6.7	315
a \ h	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	h \ a

$_a{}^h$	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	$^h{}_a$
°	°	°	°	°	°	°	°	°	°	°	°	°
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	360
1	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	359
2	1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.3	1.3	358
3	2.4	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.0	357
4	3.1	3.0	3.0	2.9	2.9	2.8	2.8	2.7	2.7	2.6	2.6	356
5	3.9	3.8	3.8	3.7	3.7	3.6	3.5	3.4	3.4	3.3	3.3	355
6	4.6	4.5	4.5	4.4	4.4	4.3	4.2	4.1	4.1	4.0	3.9	354
7	5.4	5.3	5.3	5.2	5.1	5.0	4.9	4.8	4.8	4.7	4.6	353
8	6.1	6.0	6.0	5.9	5.8	5.7	5.6	5.5	5.4	5.3	5.2	352
9	6.9	6.8	6.7	6.6	6.5	6.4	6.3	6.2	6.1	6.0	5.9	351
10	7.7	7.6	7.5	7.3	7.2	7.1	7.0	6.9	6.8	6.6	6.5	350
11	8.5	8.3	8.2	8.0	7.9	7.8	7.7	7.6	7.5	7.3	7.2	349
12	9.2	9.0	8.9	8.7	8.6	8.5	8.4	8.2	8.1	7.9	7.8	348
13	10.0	9.8	9.7	9.5	9.4	9.2	9.1	8.9	8.8	8.6	8.5	347
14	10.7	10.5	10.4	10.2	10.1	9.9	9.8	9.6	9.5	9.3	9.1	346
15	11.5	11.3	11.2	11.0	10.8	10.6	10.5	10.3	10.2	10.0	9.8	345
16	12.2	12.0	11.9	11.7	11.5	11.3	11.2	11.0	10.8	10.6	10.4	344
17	13.0	12.8	12.6	12.4	12.2	12.0	11.9	11.7	11.5	11.3	11.1	343
18	13.7	13.5	13.3	13.1	12.9	12.7	12.5	12.3	12.1	11.9	11.7	342
19	14.5	14.3	14.1	13.8	13.6	13.4	13.2	13.0	12.8	12.5	12.3	341
20	15.2	15.0	14.8	14.5	14.3	14.1	13.9	13.6	13.4	13.1	12.9	340
21	16.0	15.7	15.5	15.2	15.0	14.8	14.6	14.3	14.1	13.8	13.6	339
22	16.7	16.4	16.2	15.9	15.7	15.4	15.2	14.9	14.7	14.4	14.2	338
23	17.5	17.2	17.0	16.7	16.4	16.1	15.9	15.6	15.4	15.1	14.8	337
24	18.2	17.9	17.7	17.4	17.1	16.8	16.6	16.3	16.0	15.7	15.4	336
25	19.0	18.7	18.4	18.1	17.8	17.5	17.3	17.0	16.7	16.4	16.1	335
26	19.7	19.4	19.1	18.8	18.5	18.2	17.9	17.6	17.3	17.0	16.7	334
27	20.4	20.1	19.8	19.5	19.2	18.9	18.6	18.3	18.0	17.6	17.3	333
28	21.1	20.8	20.5	20.1	19.8	19.5	19.2	18.9	18.6	18.2	17.9	332
29	21.9	21.5	21.1	20.8	20.5	20.2	19.9	19.6	19.3	18.9	18.6	331
30	22.6	22.2	21.9	21.5	21.2	20.9	20.6	20.2	19.9	19.5	19.2	330
31	23.3	22.9	22.6	22.2	21.9	21.6	21.3	20.9	20.5	20.1	19.8	329
32	24.0	23.6	23.3	22.9	22.6	22.2	21.9	21.5	21.1	20.7	20.4	328
33	24.7	24.3	24.0	23.6	23.3	22.9	22.6	22.2	21.8	21.4	21.0	327
34	25.4	25.0	24.7	24.3	23.9	23.5	23.2	22.8	22.4	22.0	21.6	326
35	26.1	25.7	25.3	24.9	24.6	24.2	23.8	23.4	23.0	22.6	22.2	325
36	26.8	26.4	26.0	25.6	25.2	24.8	24.4	24.0	23.6	23.2	22.8	324
37	27.5	27.1	26.7	26.3	25.9	25.5	25.1	24.7	24.3	23.8	23.4	323
38	28.2	27.8	27.4	27.0	26.6	26.1	25.7	25.3	24.9	24.4	24.0	322
39	28.9	28.5	28.1	27.7	27.3	26.8	26.4	25.9	25.5	25.0	24.6	321
40	29.6	29.2	28.8	28.3	27.9	27.5	27.0	26.5	26.1	25.6	25.2	320
41	30.3	29.9	29.5	29.0	28.6	28.1	27.7	27.2	26.8	26.3	25.8	319
42	31.0	30.5	30.1	29.6	29.2	28.7	28.3	27.8	27.4	26.9	26.4	318
43	31.7	31.2	30.8	30.3	29.9	29.4	29.0	28.5	28.0	27.5	27.0	317
44	32.4	31.9	31.5	31.0	30.5	30.0	29.6	29.1	28.6	28.1	27.6	316
45	33.1	32.6	32.2	31.7	31.2	30.7	30.2	29.7	29.2	28.7	28.2	315
$^a{}_h$	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	$_h{}^a$

a \ h	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
0	− 1.8	− 0.8	+ 0.2	+ 1.2	+ 2.2	+ 3.2	+ 4.2	+ 5.2	+ 6.2	+ 7.2	+ 8.2	360
1	− 1.8	− 0.8	+ 0.2	+ 1.2	+ 2.2	+ 3.2	+ 4.2	+ 5.2	+ 6.2	+ 7.2	+ 8.2	359
2	− 1.8	− 0.8	+ 0.2	+ 1.2	+ 2.2	+ 3.2	+ 4.2	+ 5.2	+ 6.2	+ 7.2	+ 8.2	358
3	− 1.8	− 0.8	+ 0.2	+ 1.2	+ 2.2	+ 3.2	+ 4.2	+ 5.2	+ 6.2	+ 7.2	+ 8.2	357
4	− 1.7	− 0.7	+ 0.3	+ 1.3	+ 2.3	+ 3.3	+ 4.3	+ 5.3	+ 6.3	+ 7.3	+ 8.3	356
5	− 1.7	− 0.7	+ 0.3	+ 1.3	+ 2.3	+ 3.3	+ 4.3	+ 5.3	+ 6.3	+ 7.3	+ 8.3	355
6	− 1.6	− 0.6	+ 0.4	+ 1.4	+ 2.4	+ 3.4	+ 4.4	+ 5.4	+ 6.4	+ 7.4	+ 8.4	354
7	− 1.6	− 0.6	+ 0.4	+ 1.4	+ 2.4	+ 3.4	+ 4.4	+ 5.4	+ 6.4	+ 7.4	+ 8.4	353
8	− 1.5	− 0.5	+ 0.5	+ 1.5	+ 2.5	+ 3.5	+ 4.5	+ 5.5	+ 6.5	+ 7.5	+ 8.5	352
9	− 1.5	− 0.5	+ 0.5	+ 1.5	+ 2.5	+ 3.5	+ 4.5	+ 5.5	+ 6.5	+ 7.5	+ 8.5	351
10	− 1.4	− 0.4	+ 0.6	+ 1.6	+ 2.6	+ 3.6	+ 4.6	+ 5.6	+ 6.6	+ 7.6	+ 8.6	350
11	− 1.3	− 0.3	+ 0.7	+ 1.7	+ 2.7	+ 3.7	+ 4.7	+ 5.7	+ 6.7	+ 7.7	+ 8.7	349
12	− 1.2	− 0.2	+ 0.8	+ 1.8	+ 2.8	+ 3.8	+ 4.8	+ 5.8	+ 6.8	+ 7.8	+ 8.8	348
13	− 1.1	− 0.1	+ 0.9	+ 1.9	+ 2.9	+ 3.9	+ 4.9	+ 5.9	+ 6.9	+ 7.9	+ 8.9	347
14	− 1.0	0.0	+ 1.0	+ 2.0	+ 3.0	+ 4.0	+ 5.0	+ 6.0	+ 7.0	+ 8.0	+ 9.0	346
15	− 0.9	+ 0.1	+ 1.1	+ 2.1	+ 3.1	+ 4.1	+ 5.1	+ 6.1	+ 7.1	+ 8.1	+ 9.1	345
16	− 0.7	+ 0.3	+ 1.3	+ 2.3	+ 3.3	+ 4.3	+ 5.2	+ 6.2	+ 7.2	+ 8.2	+ 9.2	344
17	− 0.6	+ 0.4	+ 1.4	+ 2.4	+ 3.4	+ 4.4	+ 5.3	+ 6.3	+ 7.3	+ 8.3	+ 9.3	343
18	− 0.4	+ 0.6	+ 1.6	+ 2.6	+ 3.6	+ 4.6	+ 5.5	+ 6.5	+ 7.5	+ 8.5	+ 9.5	342
19	− 0.2	+ 0.8	+ 1.8	+ 2.8	+ 3.7	+ 4.7	+ 5.6	+ 6.6	+ 7.6	+ 8.6	+ 9.6	341
20	0.0	+ 1.0	+ 2.0	+ 3.0	+ 3.9	+ 4.9	+ 5.8	+ 6.8	+ 7.8	+ 8.8	+ 9.8	340
21	+ 0.2	+ 1.2	+ 2.1	+ 3.1	+ 4.0	+ 5.0	+ 5.9	+ 6.9	+ 7.9	+ 8.9	+ 9.9	339
22	+ 0.4	+ 1.4	+ 2.3	+ 3.3	+ 4.2	+ 5.2	+ 6.1	+ 7.1	+ 8.1	+ 9.1	+ 10.1	338
23	+ 0.6	+ 1.6	+ 2.5	+ 3.5	+ 4.4	+ 5.4	+ 6.3	+ 7.3	+ 8.2	+ 9.2	+ 10.2	337
24	+ 0.8	+ 1.8	+ 2.7	+ 3.7	+ 4.6	+ 5.6	+ 6.5	+ 7.5	+ 8.4	+ 9.4	+ 10.4	336
25	+ 1.0	+ 2.0	+ 2.9	+ 3.9	+ 4.8	+ 5.8	+ 6.7	+ 7.7	+ 8.6	+ 9.6	+ 10.5	335
26	+ 1.2	+ 2.2	+ 3.1	+ 4.1	+ 5.0	+ 6.0	+ 6.9	+ 7.9	+ 8.8	+ 9.8	+ 10.7	334
27	+ 1.4	+ 2.4	+ 3.3	+ 4.3	+ 5.2	+ 6.2	+ 7.1	+ 8.1	+ 9.0	+ 10.0	+ 10.9	333
28	+ 1.7	+ 2.7	+ 3.6	+ 4.6	+ 5.4	+ 6.4	+ 7.3	+ 8.3	+ 9.2	+ 10.2	+ 11.1	332
29	+ 1.9	+ 2.9	+ 3.8	+ 4.7	+ 5.6	+ 6.6	+ 7.5	+ 8.5	+ 9.4	+ 10.4	+ 11.3	331
30	+ 2.2	+ 3.2	+ 4.1	+ 5.0	+ 5.9	+ 6.8	+ 7.7	+ 8.7	+ 9.6	+ 10.6	+ 11.5	330
31	+ 2.4	+ 3.4	+ 4.3	+ 5.2	+ 6.1	+ 7.0	+ 7.9	+ 8.9	+ 9.8	+ 10.8	+ 11.7	329
32	+ 2.7	+ 3.7	+ 4.6	+ 5.5	+ 6.4	+ 7.3	+ 8.2	+ 9.2	+ 10.1	+ 11.1	+ 12.0	328
33	+ 2.9	+ 3.9	+ 4.8	+ 5.7	+ 6.6	+ 7.5	+ 8.4	+ 9.4	+ 10.3	+ 11.3	+ 12.2	327
34	+ 3.2	+ 4.2	+ 5.1	+ 6.0	+ 6.9	+ 7.8	+ 8.7	+ 9.7	+ 10.6	+ 11.6	+ 12.5	326
35	+ 3.5	+ 4.5	+ 5.4	+ 6.3	+ 7.2	+ 8.1	+ 9.0	+ 10.0	+ 10.9	+ 11.8	+ 12.7	325
36	+ 3.8	+ 4.8	+ 5.7	+ 6.6	+ 7.5	+ 8.4	+ 9.3	+ 10.3	+ 11.2	+ 12.1	+ 13.0	324
37	+ 4.1	+ 5.1	+ 6.0	+ 6.9	+ 7.8	+ 8.7	+ 9.6	+ 10.5	+ 11.4	+ 12.3	+ 13.2	323
38	+ 4.4	+ 5.4	+ 6.3	+ 7.2	+ 8.1	+ 9.0	+ 9.9	+ 10.8	+ 11.7	+ 12.6	+ 13.5	322
39	+ 4.7	+ 5.7	+ 6.6	+ 7.5	+ 8.4	+ 9.3	+ 10.2	+ 11.1	+ 12.0	+ 12.9	+ 13.8	321
40	+ 5.1	+ 6.0	+ 6.9	+ 7.8	+ 8.7	+ 9.6	+ 10.5	+ 11.4	+ 12.3	+ 13.2	+ 14.1	320
41	+ 5.4	+ 6.3	+ 7.2	+ 8.1	+ 9.0	+ 9.9	+ 10.8	+ 11.7	+ 12.6	+ 13.5	+ 14.4	319
42	+ 5.7	+ 6.6	+ 7.5	+ 8.4	+ 9.3	+ 10.2	+ 11.1	+ 12.0	+ 12.9	+ 13.8	+ 14.7	318
43	+ 6.0	+ 6.9	+ 7.8	+ 8.7	+ 9.6	+ 10.5	+ 11.4	+ 12.3	+ 13.2	+ 14.1	+ 15.0	317
44	+ 6.4	+ 7.3	+ 8.2	+ 9.1	+ 10.0	+ 10.9	+ 11.8	+ 12.7	+ 13.5	+ 14.4	+ 15.3	316
45	+ 6.7	+ 7.6	+ 8.5	+ 9.4	+ 10.3	+ 11.2	+ 12.1	+ 13.0	+ 13.8	+ 14.7	+ 15.6	315
a / h	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	h \ a

a \ h	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	360
1	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	359
2	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	358
3	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.7	1.7	1.6	1.6	357
4	2.6	2.5	2.5	2.4	2.4	2.3	2.3	2.2	2.2	2.1	2.1	356
5	3.3	3.2	3.2	3.1	3.0	2.9	2.9	2.8	2.8	2.7	2.7	355
6	3.9	3.8	3.8	3.7	3.6	3.5	3.5	3.4	3.3	3.2	3.2	354
7	4.6	4.5	4.4	4.3	4.2	4.1	4.1	4.0	3.9	3.8	3.7	353
8	5.2	5.1	5.0	4.9	4.8	4.7	4.6	4.5	4.4	4.3	4.2	352
9	5.9	5.8	5.7	5.5	5.4	5.3	5.2	5.1	5.0	4.9	4.8	351
10	6.5	6.4	6.3	6.1	6.0	5.9	5.8	5.6	5.5	5.4	5.3	350
11	7.2	7.0	6.9	6.7	6.6	6.5	6.4	6.2	6.1	5.9	5.8	349
12	7.8	7.6	7.5	7.3	7.2	7.0	6.9	6.7	6.6	6.4	6.3	348
13	8.5	8.3	8.2	8.0	7.8	7.6	7.5	7.3	7.2	7.0	6.9	347
14	9.1	8.9	8.8	8.6	8.4	8.2	8.1	7.9	7.7	7.5	7.4	346
15	9.8	9.6	9.4	9.2	9.0	8.8	8.7	8.5	8.3	8.1	7.9	345
16	10.4	10.2	10.0	9.8	9.6	9.4	9.2	9.0	8.8	8.6	8.4	344
17	11.1	10.8	10.6	10.4	10.2	10.0	9.8	9.6	9.4	9.2	9.0	343
18	11.7	11.4	11.2	11.0	10.8	10.6	10.4	10.1	9.9	9.7	9.5	342
19	12.3	12.0	11.8	11.6	11.4	11.2	11.0	10.7	10.5	10.2	10.0	341
20	12.9	12.6	12.4	12.2	12.0	11.7	11.5	11.2	11.0	10.7	10.5	340
21	13.6	13.3	13.0	12.8	12.6	12.3	12.1	11.8	11.6	11.3	11.0	339
22	14.2	13.9	13.6	13.3	13.1	12.8	12.6	12.3	12.1	11.8	11.5	338
23	14.8	14.5	14.2	13.9	13.7	13.4	13.2	12.9	12.6	12.3	12.0	337
24	15.4	15.1	14.8	14.5	14.3	14.0	13.7	13.4	13.1	12.8	12.5	336
25	16.1	15.7	15.4	15.1	14.9	14.6	14.3	14.0	13.7	13.3	13.0	335
26	16.7	16.3	16.0	15.7	15.4	15.1	14.8	14.5	14.2	13.8	13.5	334
27	17.3	16.9	16.6	16.3	16.0	15.7	15.4	15.0	14.7	14.3	14.0	333
28	17.9	17.5	17.2	16.9	16.6	16.2	15.9	15.5	15.2	14.8	14.5	332
29	18.6	18.2	17.8	17.5	17.2	16.8	16.5	16.1	15.8	15.4	15.0	331
30	19.2	18.8	18.4	18.0	17.7	17.3	17.0	16.6	16.3	15.9	15.5	330
31	19.8	19.4	19.0	18.6	18.3	17.9	17.6	17.2	16.8	16.4	16.0	329
32	20.4	20.0	19.6	19.2	18.9	18.5	18.1	17.7	17.3	16.9	16.5	328
33	21.0	20.6	20.2	19.8	19.5	19.1	18.7	18.3	17.9	17.4	17.0	327
34	21.6	21.2	20.8	20.4	20.0	19.6	19.2	18.8	18.4	17.9	17.5	326
35	22.2	21.8	21.4	21.0	20.6	20.2	19.8	19.3	18.9	18.4	18.0	325
36	22.8	22.4	22.0	21.6	21.2	20.7	20.3	19.8	19.4	18.9	18.5	324
37	23.4	23.0	22.6	22.2	21.8	21.3	20.9	20.4	19.9	19.4	19.0	323
38	24.0	23.6	23.2	22.7	22.3	21.8	21.4	20.9	20.4	19.9	19.5	322
39	24.6	24.2	23.8	23.3	22.9	22.4	21.9	21.4	20.9	20.4	20.0	321
40	25.2	24.7	24.3	23.8	23.4	22.9	22.4	21.9	21.4	20.9	20.4	320
41	25.8	25.3	24.9	24.4	24.0	23.5	23.0	22.4	21.9	21.4	20.9	319
42	26.4	25.9	25.5	25.0	24.5	24.0	23.5	22.9	22.4	21.9	21.4	318
43	27.0	26.5	26.1	25.6	25.1	24.5	24.0	23.4	22.9	22.4	21.9	317
44	27.6	27.1	26.6	26.1	25.6	25.0	24.5	23.9	23.4	22.8	22.3	316
45	28.2	27.7	27.2	26.7	26.2	25.6	25.1	24.5	23.9	23.3	22.8	315
a / h	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	h / a

a h	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	h a
°	°	°	°	°	°	°	°	°	°	°	°	°
0	+ 8.2	+ 9.2	+10.2	+11.2	+12.2	+13.2	+14.2	+15.2	+16.2	+17.2	+18.2	360
1	+ 8.2	+ 9.2	+10.2	+11.2	+12.2	+13.2	+14.2	+15.2	+16.2	+17.2	+18.2	359
2	+ 8.2	+ 9.2	+10.2	+11.2	+12.2	+13.2	+14.2	+15.2	+16.2	+17.2	+18.2	358
3	+ 8.2	+ 9.2	+10.2	+11.2	+12.2	+13.2	+14.2	+15.2	+16.2	+17.2	+18.2	357
4	+ 8.3	+ 9.3	+10.3	+11.3	+12.3	+13.3	+14.3	+15.3	+16.3	+17.3	+18.3	356
5	+ 8.3	+ 9.3	+10.3	+11.3	+12.3	+13.3	+14.3	+15.3	+16.3	+17.3	+18.3	355
6	+ 8.4	+ 9.4	+10.3	+11.3	+12.3	+13.3	+14.3	+15.3	+16.3	+17.3	+18.3	354
7	+ 8.4	+ 9.4	+10.3	+11.3	+12.3	+13.3	+14.3	+15.3	+16.3	+17.3	+18.3	353
8	+ 8.5	+ 9.5	+10.4	+11.4	+12.4	+13.4	+14.4	+15.4	+16.4	+17.4	+18.4	352
9	+ 8.5	+ 9.5	+10.5	+11.5	+12.4	+13.4	+14.4	+15.4	+16.4	+17.4	+18.4	351
10	+ 8.6	+ 9.6	+10.5	+11.5	+12.5	+13.5	+14.5	+15.5	+16.5	+17.5	+18.5	350
11	+ 8.7	+ 9.7	+10.6	+11.6	+12.6	+13.6	+14.6	+15.6	+16.6	+17.6	+18.6	349
12	+ 8.8	+ 9.8	+10.7	+11.7	+12.7	+13.7	+14.7	+15.7	+16.7	+17.7	+18.7	348
13	+ 8.9	+ 9.9	+10.8	+11.8	+12.8	+13.8	+14.8	+15.8	+16.8	+17.8	+18.7	347
14	+ 9.0	+10.0	+10.9	+11.9	+12.9	+13.9	+14.9	+15.9	+16.9	+17.9	+18.8	346
15	+ 9.1	+10.1	+11.0	+12.0	+13.0	+14.0	+15.0	+16.0	+17.0	+18.0	+18.9	345
16	+ 9.2	+10.2	+11.1	+12.1	+13.1	+14.1	+15.1	+16.1	+17.1	+18.1	+19.0	344
17	+ 9.3	+10.3	+12.2	+12.2	+13.2	+14.2	+15.2	+16.2	+17.2	+18.2	+19.1	343
18	+ 9.5	+10.5	+11.4	+12.4	+13.4	+14.4	+15.3	+16.3	+17.3	+18.3	+19.2	342
19	+ 9.6	+10.6	+11.5	+12.5	+13.5	+14.5	+15.4	+16.4	+17.4	+18.4	+19.3	341
20	+ 9.8	+10.8	+11.7	+12.7	+13.7	+14.7	+15.6	+16.6	+17.5	+18.5	+19.4	340
21	+ 9.9	+10.9	+11.8	+12.8	+13.8	+14.8	+15.7	+16.7	+17.6	+18.6	+19.5	339
22	+10.1	+11.1	+12.0	+13.0	+13.9	+14.9	+15.8	+16.8	+17.7	+18.7	+19.6	338
23	+10.2	+11.2	+12.1	+13.1	+14.0	+15.0	+15.9	+16.9	+17.8	+18.8	+19.7	337
24	+10.4	+11.4	+12.3	+13.3	+14.2	+15.2	+16.1	+17.1	+18.0	+19.0	+19.9	336
25	+10.5	+11.5	+12.4	+13.4	+14.3	+15.3	+16.2	+17.2	+18.1	+19.1	+20.0	335
26	+10.7	+11.7	+12.6	+13.6	+14.5	+15.5	+16.4	+17.4	+18.3	+19.3	+20.2	334
27	+10.9	+11.9	+12.8	+13.8	+14.7	+15.7	+16.6	+17.6	+18.5	+19.5	+20.4	333
28	+11.1	+12.1	+13.0	+14.0	+14.9	+15.9	+16.8	+17.8	+18.7	+19.7	+20.6	332
29	+11.3	+12.3	+13.2	+14.2	+15.1	+16.1	+17.0	+18.0	+18.9	+19.8	+20.7	331
30	+11.5	+12.5	+13.4	+14.4	+15.3	+16.3	+17.2	+18.2	+19.1	+20.0	+20.9	330
31	+11.7	+12.7	+13.6	+14.6	+15.5	+16.5	+17.4	+18.4	+19.3	+20.2	+21.1	329
32	+12.0	+12.9	+13.8	+14.8	+15.7	+16.7	+17.6	+18.6	+19.5	+20.4	+21.3	328
33	+12.2	+13.1	+14.0	+15.0	+15.9	+16.9	+17.8	+18.8	+19.7	+20.6	+21.5	327
34	+12.5	+13.4	+14.3	+15.3	+16.2	+17.1	+18.0	+19.0	+19.9	+20.8	+21.7	326
35	+12.7	+13.6	+14.5	+15.5	+16.4	+17.3	+18.2	+19.2	+20.1	+21.0	+21.9	325
36	+13.0	+13.9	+14.8	+15.8	+16.7	+17.6	+18.5	+19.4	+20.3	+21.2	+22.1	324
37	+13.2	+14.1	+15.0	+16.0	+16.9	+17.8	+18.7	+19.6	+20.5	+21.4	+22.3	323
38	+13.5	+14.4	+15.3	+16.3	+17.2	+18.1	+19.0	+19.9	+20.8	+21.7	+22.5	322
39	+13.8	+14.7	+15.6	+16.5	+17.4	+18.3	+19.2	+20.1	+21.0	+21.9	+22.7	321
40	+14.1	+15.0	+15.9	+16.8	+17.7	+18.6	+19.5	+20.4	+21.3	+22.2	+23.0	320
41	+14.4	+15.3	+16.1	+17.0	+17.9	+18.8	+19.7	+20.6	+21.5	+22.4	+23.2	319
42	+14.7	+15.6	+16.4	+17.3	+18.2	+19.1	+20.0	+20.9	+21.8	+22.7	+23.5	318
43	+15.0	+15.9	+16.7	+17.6	+18.5	+19.4	+20.2	+21.1	+22.0	+22.9	+23.7	317
44	+15.3	+16.2	+17.0	+17.9	+18.8	+19.7	+20.5	+21.4	+22.3	+23.2	+24.0	316
45	+15.6	+16.5	+17.3	+18.2	+19.1	+20.0	+20.8	+21.7	+22.5	+23.4	+24.2	315
a h	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	h a

a \ h	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	360
1	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	359
2	1.1	1.1	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.8	358
3	1.6	1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.3	1.3	1.2	357
4	2.1	2.1	2.0	2.0	1.9	1.9	1.8	1.8	1.7	1.7	1.6	356
5	2.7	2.6	2.5	2.5	2.4	2.4	2.3	2.2	2.1	2.1	2.0	355
6	3.2	3.1	3.0	3.0	2.9	2.8	2.7	2.6	2.5	2.5	2.4	354
7	3.7	3.6	3.5	3.5	3.4	3.3	3.2	3.1	2.9	2.9	2.8	353
8	4.2	4.1	4.0	3.9	3.8	3.7	3.6	3.5	3.3	3.2	3.1	352
9	4.8	4.7	4.5	4.4	4.3	4.2	4.1	4.0	3.8	3.7	3.5	351
10	5.3	5.2	5.0	4.9	4.8	4.7	4.5	4.4	4.2	4.1	3.9	350
11	5.8	5.7	5.5	5.4	5.3	5.2	5.0	4.8	4.6	4.5	4.3	349
12	6.3	6.2	6.0	5.9	5.7	5.6	5.4	5.2	5.0	4.9	4.7	348
13	6.9	6.7	6.5	6.4	6.2	6.0	5.8	5.6	5.4	5.3	5.1	347
14	7.4	7.2	7.0	6.8	6.6	6.4	6.2	6.0	5.8	5.6	5.4	346
15	7.9	7.7	7.5	7.3	7.1	6.9	6.7	6.5	6.2	6.0	5.8	345
16	8.4	8.2	8.0	7.8	7.5	7.3	7.1	6.9	6.6	6.4	6.2	344
17	9.0	8.8	8.5	8.3	8.0	7.8	7.6	7.4	7.1	6.9	6.6	343
18	9.5	9.3	9.0	8.8	8.5	8.3	8.0	7.8	7.5	7.3	7.0	342
19	10.0	9.8	9.5	9.3	9.0	8.8	8.5	8.2	7.9	7.7	7.4	341
20	10.5	10.3	10.0	9.7	9.4	9.2	8.9	8.6	8.3	8.0	7.7	340
21	11.0	10.8	10.5	10.2	9.9	9.6	9.3	9.0	8.7	8.4	8.1	339
22	11.5	11.2	10.9	10.6	10.3	10.0	9.7	9.4	9.1	8.8	8.4	338
23	12.0	11.7	11.4	11.1	10.8	10.5	10.2	9.9	9.5	9.2	8.8	337
24	12.5	12.2	11.9	11.6	11.3	11.0	10.6	10.3	9.9	9.6	9.2	336
25	13.0	12.7	12.4	12.1	11.8	11.5	11.1	10.7	10.3	10.0	9.6	335
26	13.5	13.2	12.9	12.6	12.2	11.9	11.5	11.1	10.7	10.4	10.0	334
27	14.0	13.7	13.4	13.1	12.7	12.3	11.9	11.5	11.1	10.8	10.4	333
28	14.5	14.2	13.8	13.5	13.1	12.7	12.3	11.9	11.5	11.2	10.7	332
29	15.0	14.7	14.3	14.0	13.6	13.2	12.8	12.4	11.9	11.5	11.1	331
30	15.5	15.2	14.8	14.4	14.0	13.6	13.2	12.8	12.3	11.9	11.4	330
31	16.0	15.7	15.3	14.9	14.5	14.1	13.6	13.2	12.7	12.3	11.8	329
32	16.5	16.1	15.7	15.3	14.9	14.5	14.0	13.6	13.1	12.7	12.2	328
33	17.0	16.6	16.2	15.8	15.4	15.0	14.5	14.0	13.5	13.1	12.6	327
34	17.5	17.1	16.7	16.3	15.8	15.4	14.9	14.4	13.9	13.4	12.9	326
35	18.0	17.6	17.2	16.8	16.3	15.8	15.3	14.8	14.3	13.8	13.3	325
36	18.5	18.1	17.6	17.2	16.7	16.2	15.7	15.2	14.6	14.1	13.6	324
37	19.0	18.6	18.1	17.6	17.1	16.6	16.1	15.6	15.0	14.5	14.0	323
38	19.5	19.0	18.5	18.0	17.5	17.0	16.5	16.0	15.4	14.9	14.3	322
39	20.0	19.5	19.0	18.5	18.0	17.5	16.9	16.4	15.8	15.3	14.7	321
40	20.4	19.9	19.4	18.9	18.4	17.9	17.3	16.7	16.1	15.6	15.0	320
41	20.9	20.4	19.9	19.4	18.8	18.3	17.7	17.1	16.5	16.0	15.4	319
42	21.4	20.9	20.3	19.8	19.2	18.7	18.1	17.5	16.9	16.3	15.7	318
43	21.9	21.4	20.8	20.3	19.7	19.1	18.5	17.9	17.3	16.7	16.0	317
44	22.3	21.8	21.2	20.7	20.1	19.5	18.9	18.3	17.6	17.0	16.3	316
45	22.8	22.3	21.7	21.1	20.5	19.9	19.2	18.7	18.0	17.3	16.6	315
a \ h	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	h \ a

a / h	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
0	+18.2	+19.2	+20.2	+21.2	+22.2	+23.2	+24.2	+25.2	+26.2	+27.2	+28.2	360
1	+18.2	+19.2	+20.2	+21.2	+22.2	+23.2	+24.2	+25.2	+26.2	+27.2	+28.2	359
2	+18.2	+19.2	+20.2	+21.2	+22.2	+23.2	+24.2	+25.2	+26.2	+27.2	+28.2	358
3	+18.2	+19.2	+20.2	+21.2	+22.2	+23.2	+24.2	+25.2	+26.2	+27.2	+28.2	357
4	+18.3	+19.3	+20.3	+21.3	+22.3	+23.2	+24.3	+25.3	+26.3	+27.3	+28.3	356
5	+18.3	+19.3	+20.3	+21.3	+22.3	+23.3	+24.3	+25.3	+26.3	+27.3	+28.3	355
6	+18.3	+19.3	+20.3	+21.3	+22.3	+23.3	+24.3	+25.3	+26.3	+27.3	+28.3	354
7	+18.3	+19.3	+20.3	+21.3	+22.3	+23.3	+24.3	+25.3	+26.3	+27.3	+28.3	353
8	+18.4	+19.4	+20.4	+21.4	+22.4	+23.4	+24.4	+25.4	+26.4	+27.4	+28.4	352
9	+18.4	+19.4	+20.4	+21.4	+22.4	+23.4	+24.4	+25.4	+26.4	+27.4	+28.4	351
10	+18.5	+19.5	+20.5	+21.5	+22.5	+23.5	+24.5	+25.5	+26.5	+27.5	+28.5	350
11	+18.6	+19.6	+20.6	+21.6	+22.5	+23.5	+24.5	+25.5	+26.5	+27.5	+28.5	349
12	+18.7	+19.7	+20.7	+21.7	+22.6	+23.6	+24.6	+25.6	+26.6	+27.6	+28.6	348
13	+18.7	+19.7	+20.7	+21.7	+22.6	+23.6	+24.6	+25.6	+26.6	+27.6	+28.6	347
14	+18.8	+19.8	+20.8	+21.8	+22.7	+23.7	+24.7	+25.7	+26.7	+27.7	+28.7	346
15	+18.9	+19.9	+20.9	+21.9	+22.8	+23.8	+24.8	+25.8	+26.7	+27.7	+28.7	345
16	+19.0	+20.0	+21.0	+22.0	+22.9	+23.9	+24.9	+25.9	+26.8	+27.8	+28.8	344
17	+19.1	+20.1	+21.1	+22.1	+23.0	+24.0	+25.0	+26.0	+26.9	+27.9	+28.8	343
18	+19.2	+20.2	+21.2	+22.2	+23.1	+24.1	+25.1	+26.1	+27.0	+28.0	+28.9	342
19	+19.3	+20.3	+21.3	+22.3	+23.2	+24.2	+25.2	+26.2	+27.1	+28.1	+29.0	341
20	+19.4	+20.4	+21.4	+22.4	+23.3	+24.3	+25.3	+26.3	+27.2	+28.2	+29.1	340
21	+19.5	+20.5	+21.5	+22.5	+23.4	+24.4	+25.4	+26.4	+27.3	+28.3	+29.2	339
22	+19.6	+20.6	+21.6	+22.6	+23.5	+24.5	+25.5	+26.5	+27.4	+28.4	+29.3	338
23	+19.7	+20.7	+21.7	+22.7	+23.6	+24.6	+25.6	+26.6	+27.5	+28.5	+29.4	337
24	+19.9	+20.9	+21.9	+22.9	+23.8	+24.8	+25.7	+26.7	+27.6	+28.6	+29.5	336
25	+20.0	+21.0	+22.0	+23.0	+23.9	+24.9	+25.8	+26.8	+27.7	+28.7	+29.6	335
26	+20.2	+21.2	+22.2	+23.2	+24.1	+25.0	+25.9	+26.9	+27.8	+28.8	+29.7	334
27	+20.4	+21.4	+22.3	+23.3	+24.2	+25.1	+26.0	+27.0	+27.9	+28.9	+29.8	333
28	+20.6	+21.6	+22.5	+23.4	+24.3	+25.3	+26.2	+27.2	+28.1	+29.1	+30.0	332
29	+20.7	+21.7	+22.6	+23.5	+24.4	+25.4	+26.3	+27.3	+28.2	+29.2	+30.1	331
30	+20.9	+21.9	+22.8	+23.7	+24.6	+25.6	+26.5	+27.5	+28.4	+29.3	+30.2	330
31	+21.1	+22.1	+23.0	+23.9	+24.8	+25.8	+26.7	+27.6	+28.5	+29.4	+30.3	329
32	+21.3	+22.3	+23.2	+24.1	+25.0	+26.0	+26.9	+27.8	+28.7	+29.6	+30.5	328
33	+21.5	+22.4	+23.3	+24.2	+25.1	+26.1	+27.0	+27.9	+28.8	+29.7	+30.6	327
34	+21.7	+22.6	+23.5	+24.4	+25.3	+26.3	+27.2	+28.1	+29.0	+29.9	+30.8	326
35	+21.9	+22.8	+23.7	+24.6	+25.5	+26.4	+27.3	+28.2	+29.1	+30.0	+30.9	325
36	+22.1	+23.0	+23.9	+24.8	+25.7	+26.6	+27.5	+28.4	+29.3	+30.2	+31.2	324
37	+22.3	+23.2	+24.1	+25.0	+25.9	+26.8	+27.7	+28.6	+29.4	+30.3	+31.2	323
38	+22.5	+23.4	+24.3	+25.2	+26.1	+27.0	+27.9	+28.8	+29.6	+30.5	+31.3	322
39	+22.7	+23.6	+24.5	+25.4	+26.3	+27.2	+28.1	+29.0	+29.8	+30.7	+31.6	321
40	+23.0	+23.9	+24.8	+25.7	+26.5	+27.4	+28.3	+29.2	+30.0	+30.9	+31.8	320
41	+23.2	+24.1	+25.0	+25.9	+26.7	+27.6	+28.5	+29.4	+30.2	+31.1	+31.9	319
42	+23.5	+24.4	+25.2	+26.1	+26.9	+27.8	+28.7	+29.6	+30.4	+31.3	+32.1	318
43	+23.7	+24.6	+25.4	+26.3	+27.1	+28.0	+28.9	+29.8	+30.6	+31.5	+32.3	317
44	+24.0	+24.9	+25.7	+26.6	+27.4	+28.3	+29.1	+30.0	+30.8	+31.7	+32.5	316
45	+24.2	+25.1	+25.9	+26.8	+27.6	+28.5	+29.3	+30.2	+31.0	+31.9	+32.7	315
a / h	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	h / a

a \ h	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	360
1	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	359
2	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.5	358
3	1.2	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.8	0.8	0.7	357
4	1.6	1.5	1.4	1.4	1.3	1.3	1.2	1.2	1.1	1.0	0.9	356
5	2.0	1.9	1.8	1.8	1.7	1.6	1.5	1.5	1.4	1.3	1.2	355
6	2.4	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	354
7	2.8	2.7	2.6	2.5	2.4	2.3	2.1	2.0	1.9	1.8	1.6	353
8	3.1	3.0	2.9	2.8	2.7	2.6	2.4	2.3	2.1	2.0	1.8	352
9	3.5	3.4	3.3	3.2	3.0	2.9	2.7	2.6	2.4	2.3	2.1	351
10	3.9	3.8	3.6	3.5	3.3	3.2	3.0	2.8	2.6	2.5	2.3	350
11	4.3	4.1	4.0	3.8	3.6	3.5	3.3	3.1	2.9	2.7	2.5	349
12	4.7	4.5	4.3	4.1	3.9	3.7	3.5	3.3	3.1	2.9	2.7	348
13	5.1	4 9	4.7	4 5	4.3	4.1	3.8	3.6	3.4	3.2	2.9	347
14	5.4	5.2	5.0	4.8	4.6	4.4	4.1	3.9	3.6	3.4	3.1	346
15	5.8	5 6	5.4	5.2	4.9	4.7	4.4	4.2	3.9	3.6	3.3	345
16	6.2	6.0	5.7	5.5	5.2	5.0	4.7	4.4	4.1	3.8	3.5	344
17	6.6	6.4	6.1	5.9	5.6	5.3	5.0	4.7	4.4	4.1	3.8	343
18	7.0	6.7	6.4	6.2	5.9	5.6	5.3	5.0	4.7	4.3	4.0	342
19	7.4	7.1	6.8	6.5	6.2	5.9	5.6	5.3	4.9	4.6	4.2	341
20	7.7	7.4	7.1	6.8	6.5	6.2	5.8	5.5	5.1	4.8	4.4	340
21	8.1	7.8	7.5	7.2	6.8	6.5	6.1	5.8	5.4	5.0	4.6	339
22	8.4	8.1	7.8	7.5	7.1	6.8	6.4	6.0	5.6	5.2	4.8	338
23	8 8	8.5	8.2	7.8	7.4	7.1	6.7	6.3	5.9	5.5	5.0	337
24	9 2	8.9	8.5	8.1	7.7	7.3	6.9	6.5	6.1	5.7	5.2	336
25	9.6	9.3	8.9	8.5	8.0	7.6	7.2	6.8	6.3	5.9	5.4	335
26	10.0	9.6	9.2	8.8	8.3	7.9	7.4	7.0	6.5	6.1	5.6	334
27	10.4	10.0	9.5	9.1	8.6	8.2	7.7	7.3	6.8	6.3	5.8	333
28	10.7	10.3	9.8	9.4	8.9	8.5	8.0	7.5	7.0	6.5	6.0	332
29	11.1	10.7	10.2	9.8	9.3	8.8	8.3	7.8	7.3	6.8	6.2	331
30	11.4	11.0	10.5	10.1	9.6	9.1	8.6	8.1	7.5	7.0	6.4	330
31	11.8	11.4	10.9	10.4	9.9	9.4	8.9	8.4	7.8	7.2	6.6	329
32	12.2	11.7	11.2	10.7	10.2	9.7	9.1	8.6	8.0	7.4	6.8	328
33	12.6	12.1	11 6	11.1	10.5	10.0	9.4	8.9	8.3	7.7	7.0	327
34	12.9	12.4	11.9	11.4	10.8	10.3	9.7	7.1	8.5	7.9	7.2	326
35	13.3	12.8	12.2	11.7	11.1	10.6	10.0	9.4	8.7	8.1	7.4	325
36	13.6	13.1	12.5	12.0	11.4	10.8	10.2	9.6	8.9	8.3	7.6	324
37	14.0	13.5	12.9	12.3	11.7	11.1	10.5	9.9	9.2	8.5	7.8	323
38	14.3	13.8	13.2	12.6	12.0	11.4	10.7	10.0	9.4	8.7	8.0	322
39	14.7	14.1	13.5	12.8	12.3	11.7	11.0	10.3	9.6	8.9	8.2	321
40	15.0	14.4	13.8	12.2	12.5	11.9	11.2	10.5	9.8	9.1	8.4	320
41	15.4	14.8	14.1	13.5	12.8	12.2	11.5	10 8	10.1	9.4	8.6	319
42	15.7	15.1	14.4	13.8	13.1	12 4	11.7	11.0	10.3	9.6	8.8	318
43	16.0	15.4	14.7	14.1	13.4	12.7	12.0	11.3	10.5	9.8	9.0	317
44	16.3	15 7	15.0	14.3	13.6	12.9	12.2	11.5	10.7	10.0	9.2	316
45	16.6	16.0	15.3	14.6	13.9	13.2	12.5	11 8	11.0	10.2	9 4	315
a \ h	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	h \ a

a \ h	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
0	+28.2	+29.2	+30.2	+31.2	+32.2	+33.2	+34.2	+35.2	+36.2	+37.2	+38.2	360
1	+28.2	+29.2	+30.2	+31.2	+32.2	+33.2	+34.2	+35.2	+36.2	+37.2	+38.2	359
2	+28.2	+29.2	+30.2	+31.2	+32.2	+33.2	+34.2	+35.2	+36.2	+37.2	+38.2	358
3	+28.2	+29.2	+30.2	+31.2	+32.2	+33.2	+34.2	+35.2	+36.2	+37.2	+38.2	357
4	+28.3	+29.3	+30.2	+31.2	+32.2	+33.2	+34.2	+35.2	+36.2	+37.2	+38.2	356
5	+28.3	+29.3	+30.2	+31.2	+32.2	+33.2	+34.2	+35.2	+36.2	+37.2	+38.2	355
6	+28.3	+29.3	+30.2	+31.2	+32.2	+33.2	+34.2	+35.2	+36.2	+37.2	+38.2	354
7	+28.3	+29.3	+30.2	+31.2	+32.2	+33.2	+34.2	+35.2	+36.2	+37.2	+38.2	353
8	+28.4	+29.4	+30.3	+31.3	+32.3	+33.3	+34.3	+35.3	+36.3	+37.3	+38.3	352
9	+28.4	+29.4	+30.3	+31.3	+32.3	+33.3	+34.3	+35.3	+36.3	+37.3	+38.3	351
10	+28.5	+29.5	+30.4	+31.4	+32.4	+33.4	+34.4	+35.4	+36.4	+37.4	+38.3	350
11	+28.5	+29.5	+30.4	+31.4	+32.4	+33.4	+34.4	+35.4	+36.4	+37.4	+38.3	349
12	+28.6	+29.6	+30.5	+31.5	+32.5	+33.5	+34.5	+35.5	+36.4	+37.4	+38.4	348
13	+28.6	+29.6	+30.5	+31.5	+32.5	+33.5	+34.5	+35.5	+36.4	+37.4	+38.4	347
14	+28.7	+29.7	+30.6	+31.6	+32.6	+33.6	+34.6	+35.6	+36.5	+37.5	+38.4	346
15	+28.7	+29.7	+30.6	+31.6	+32.6	+33.6	+34.6	+35.6	+36.5	+37.5	+38.4	345
16	+28.8	+29.8	+30.7	+31.7	+32.7	+33.7	+34.7	+35.7	+36.6	+37.6	+38.5	344
17	+28.8	+29.8	+30.7	+31.7	+32.7	+33.7	+34.7	+35.7	+36.6	+37.6	+38.5	343
18	+28.9	+29.9	+30.8	+31.8	+32.8	+33.8	+34.8	+35.8	+36.7	+37.7	+38.6	342
19	+29.0	+30.0	+30.9	+31.9	+32.9	+33.9	+34.8	+35.8	+36.7	+37.7	+38.6	341
20	+29.1	+30.1	+31.0	+32.0	+33.0	+34.0	+34.9	+35.9	+36.8	+37.8	+38.7	340
21	+29.2	+30.2	+31.1	+32.1	+33.0	+34.0	+34.9	+35.9	+36.8	+37.8	+38.7	339
22	+29.3	+30.3	+31.2	+32.2	+33.1	+34.1	+35.0	+36.0	+36.9	+37.9	+38.8	338
23	+29.4	+30.4	+31.3	+32.3	+33.2	+34.2	+35.1	+36.1	+37.0	+37.9	+38.8	337
24	+29.5	+30.5	+31.4	+32.4	+33.3	+34.3	+35.2	+36.2	+37.1	+38.0	+38.9	336
25	+29.6	+30.6	+31.5	+32.5	+33.4	+34.3	+35.2	+36.2	+37.1	+38.0	+38.9	335
26	+29.7	+30.7	+31.6	+32.6	+33.5	+34.4	+35.3	+36.3	+37.3	+38.1	+39.0	334
27	+29.8	+30.8	+31.7	+32.7	+33.6	+34.5	+35.4	+36.4	+37.3	+38.2	+39.1	333
28	+30.0	+30.9	+31.8	+32.8	+33.7	+34.6	+35.5	+36.5	+37.4	+38.3	+39.2	332
29	+30.1	+31.0	+31.9	+32.9	+33.8	+34.7	+35.6	+36.5	+37.4	+38.3	+39.2	331
30	+30.2	+31.1	+32.0	+33.0	+33.9	+34.8	+35.7	+36.6	+37.5	+38.4	+39.3	330
31	+30.3	+31.2	+32.1	+33.1	+34.0	+34.9	+35.8	+36.7	+37.6	+38.5	+39.4	329
32	+30.5	+31.4	+32.3	+33.2	+34.1	+35.0	+35.9	+36.8	+37.7	+38.6	+39.5	328
33	+30.6	+31.5	+32.4	+33.3	+34.2	+35.1	+36.0	+36.9	+37.8	+38.7	+39.5	327
34	+30.8	+31.7	+32.6	+33.5	+34.4	+35.3	+36.1	+37.0	+37.9	+38.8	+39.6	326
35	+30.9	+31.8	+32.7	+33.6	+34.5	+35.4	+36.2	+37.1	+38.0	+38.9	+39.7	325
36	+31.1	+32.0	+32.9	+33.8	+34.7	+35.6	+36.4	+37.3	+38.1	+39.0	+39.8	324
37	+31.2	+32.1	+33.0	+33.9	+34.8	+35.7	+36.5	+37.4	+38.2	+39.1	+39.9	323
38	+31.4	+32.3	+33.2	+34.1	+34.9	+35.8	+36.6	+37.5	+38.3	+39.2	+40.0	322
39	+31.6	+32.5	+33.3	+34.2	+35.1	+35.9	+36.7	+37.6	+38.4	+39.3	+40.1	321
40	+31.8	+32.7	+33.5	+34.4	+35.2	+36.1	+36.9	+37.8	+38.6	+39.4	+40.2	320
41	+31.9	+32.8	+33.6	+34.5	+35.3	+36.2	+37.0	+37.9	+38.7	+39.5	+40.3	319
42	+32.1	+33.0	+33.8	+34.7	+35.5	+36.3	+37.1	+38.0	+38.8	+39.6	+40.4	318
43	+32.3	+33.1	+33.9	+34.8	+35.6	+36.4	+37.2	+38.1	+38.9	+39.7	+40.5	317
44	+32.5	+33.3	+34.1	+35.0	+35.8	+36.6	+37.4	+38.2	+39.0	+39.8	+40.6	316
45	+32.7	+33.5	+34.3	+35.2	+36.0	+36.8	+37.6	+38.4	+39.2	+40.0	+40.7	315
a \ h	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	h \ a

a \ h	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	360
1	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	359
2	0.5	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.0	358
3	0.7	0.7	0.6	0.6	0.5	0.4	0.3	0.3	0.2	0.1	0.0	357
4	0.9	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1	0.0	356
5	1.2	1.1	1.0	1.9	0.8	0.7	0.5	0.4	0.3	0.2	0.0	355
6	1.4	1.3	1.2	1.1	0.9	0.8	0.6	0.5	0.3	0.2	0.0	354
7	1.6	1.5	1.4	1.2	1.0	0.9	0.7	0.6	0.4	0.2	0.0	353
8	1.8	1.7	1.5	1.3	1.1	1.0	0.8	0.6	0.4	0.2	0.0	352
9	2.1	1.9	1.7	1.5	1.3	1.1	0.9	0.7	0.5	0.3	0.0	351
10	2.3	2.1	1.9	1.7	1.4	1.2	1.0	0.8	0.5	0.3	0.0	350
11	2.5	2.3	2.1	1.9	1.6	1.4	1.1	0.9	0.6	0.3	0.0	349
12	2.7	2.5	2.2	2.0	1.7	1.5	1.2	0.9	0.6	0.3	0.0	348
13	2.9	2.7	2.4	2.2	1.9	1.6	1.3	1.0	0.7	0.4	0.0	347
14	3.1	2.9	2.6	2.4	2.0	1.7	1.4	1.1	0.7	0.4	0.0	346
15	3.3	3.1	2.8	2.5	2.1	1.8	1.5	1.2	0.8	0.4	0.0	345
16	3.5	3.2	2.9	2.6	2.2	1.9	1.5	1.2	0.8	0.4	0.0	344
17	3.8	3.5	3.1	2.8	2.4	2.0	1.6	1.3	0.9	0.5	0.0	343
18	4.0	3.7	3.3	2.9	2.5	2.1	1.7	1.3	0.9	0.5	0.0	342
19	4.2	3.9	3.5	3.1	2.7	2.3	1.8	1.4	1.0	0.5	0.0	341
20	4.4	4.0	3.6	3.2	2.8	2.4	1.9	1.5	1.0	0.5	0.0	340
21	4.6	4.2	3.8	3.4	3.0	2.5	2.0	1.6	1.1	0.6	0.0	339
22	4.8	4.4	4.0	3.6	3.1	2.6	2.1	1.6	1.1	0.6	0.0	338
23	5.0	4.6	4.2	3.7	3.2	2.7	2.2	1.7	1.2	0.6	0.0	337
24	5.2	4.8	4.3	3.8	3.3	2.8	2.3	1.8	1.2	0.6	0.0	336
25	5.4	5.0	4.5	4.0	3.5	3.0	2.4	1.9	1.3	0.7	0.0	335
26	5.6	5.1	4.6	4.1	3.6	3.1	2.5	1.9	1.3	0.7	0.0	334
27	5.8	5.3	4.8	4.3	3.7	3.2	2.6	2.0	1.4	0.7	0.0	333
28	6.0	5.5	4.9	4.4	3.8	3.2	2.6	2.0	1.4	0.7	0.0	332
29	6.2	5.7	5.1	4.6	4.0	3.4	2.7	2.1	1.5	0.8	0.0	331
30	6.4	5.9	5.3	4.7	4.1	3.5	2.8	2.2	1.5	0.8	0.0	330
31	6.6	6.1	5.5	4.9	4.2	3.6	2.9	2.2	1.5	0.8	0.0	329
32	6.8	6.2	5.6	5.0	4.3	3.6	2.9	2.2	1.5	0.8	0.0	328
33	7.0	6.4	5.8	5.1	4.4	3.7	3.0	2.3	1.6	0.8	0.0	327
34	7.2	6.6	5.9	5.2	4.5	3.8	3.1	2.4	1.6	0.8	0.0	326
35	7.4	6.8	6.1	5.4	4.7	4.0	3.2	2.5	1.7	0.9	0.0	325
36	7.6	6.9	6.2	5.5	4.8	4.1	3.3	2.5	1.7	0.9	0.0	324
37	7.8	7.1	6.4	5.7	5.0	4.2	3.4	2.6	1.8	0.9	0.0	323
38	8.0	7.3	6.6	5.9	5.1	4.3	3.5	2.7	1.8	0.9	0.0	322
39	8.2	7.5	6.8	6.0	5.2	4.4	3.6	2.8	1.9	1.0	0.0	321
40	8.4	7.7	6.9	6.1	5.3	4.5	3.6	2.8	1.9	1.0	0.0	320
41	8.6	7.9	7.1	6.3	5.5	4.6	3.7	2.9	2.0	1.0	0.0	319
42	8.8	8.0	7.2	6.4	5.6	4.7	3.8	2.9	2.0	1.0	0.0	318
43	9.0	8.2	7.4	6.6	5.7	4.8	3.9	3.0	2.0	1.0	0.0	317
44	9.2	8.4	7.5	6.7	5.8	4.9	3.9	3.0	2.0	1.0	0.0	316
45	9.4	8.6	7.7	6.8	5.9	5.0	4.0	3.1	2.1	1.1	0.0	315
a \ h	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	h / a

a \ h	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
0	+38.2	+39.2	+40.2	+41.2	+42.2	+43.2	+44.2	+45.2	+46.2	+47.2	+48.2	360
1	+38.2	+39.2	+40.2	+41.2	+42.2	+43.2	+44.2	+45.2	+46.2	+47.2	+48.2	359
2	+38.2	+39.2	+40.2	+41.2	+42.2	+43.2	+44.2	+45.2	+46.2	+47.2	+48.2	358
3	+38.2	+39.2	+40.2	+41.2	+42.2	+43.2	+44.2	+45.2	+46.2	+47.2	+48.2	357
4	+38.2	+39.2	+40.2	+41.2	+42.2	+43.2	+44.2	+45.2	+46.2	+47.2	+48.2	356
5	+38.2	+39.2	+40.2	+41.2	+42.2	+43.2	+44.2	+45.2	+46.2	+47.2	+48.2	355
6	+38.2	+39.2	+40.2	+41.2	+42.2	+43.2	+44.2	+45.2	+46.2	+47.2	+48.2	354
7	+38.2	+39.2	+40.2	+41.2	+42.2	+43.2	+44.2	+45.2	+46.2	+47.2	+48.2	353
8	+38.3	+39.3	+40.3	+41.3	+42.3	+43.3	+44.2	+45.2	+46.2	+47.2	+48.2	352
9	+38.3	+39.3	+40.3	+41.3	+42.3	+43.3	+44.2	+45.2	+46.2	+47.2	+48.2	351
10	+38.3	+39.3	+40.3	+41.3	+42.3	+43.3	+44.2	+45.2	+46.2	+47.2	+48.2	350
11	+38.3	+39.3	+40.3	+41.3	+42.3	+43.3	+44.2	+45.2	+46.2	+47.2	+48.2	349
12	+38.4	+39.4	+40.3	+41.3	+42.3	+43.3	+44.3	+45.3	+46.3	+47.3	+48.2	348
13	+38.4	+39.4	+40.3	+41.3	+42.3	+43.3	+44.3	+45.3	+46.3	+47.3	+48.2	347
14	+38.4	+39.4	+40.3	+41.3	+42.3	+43.3	+44.3	+45.3	+46.3	+47.3	+48.2	346
15	+38.4	+39.4	+40.3	+41.3	+42.3	+43.3	+44.3	+45.3	+46.3	+47.3	+48.2	345
16	+38.5	+39.5	+40.4	+41.4	+42.4	+43.4	+44.3	+45.3	+46.3	+47.3	+48.2	344
17	+38.5	+39.5	+40.4	+41.4	+42.4	+43.4	+44.3	+45.3	+46.3	+47.3	+48.2	343
18	+38.6	+39.6	+40.5	+41.5	+42.4	+43.4	+44.3	+45.3	+46.3	+47.3	+48.2	342
19	+38.6	+39.6	+40.5	+41.5	+42.4	+43.4	+44.3	+45.3	+46.3	+47.3	+48.2	341
20	+38.7	+39.7	+40.6	+41.6	+42.5	+43.5	+44.4	+45.4	+46.3	+47.3	+48.2	340
21	+38.7	+39.7	+40.6	+41.6	+42.5	+43.5	+44.4	+45.4	+46.3	+47.3	+48.2	339
22	+38.8	+39.8	+40.7	+41.7	+42.6	+43.5	+44.4	+45.4	+46.3	+47.3	+48.2	338
23	+38.8	+39.8	+40.7	+41.7	+42.6	+43.5	+44.4	+45.4	+46.3	+47.3	+48.2	337
24	+38.9	+39.9	+40.8	+41.8	+42.7	+43.6	+44.5	+45.5	+46.4	+47.3	+48.2	336
25	+38.9	+39.9	+40.8	+41.8	+42.7	+43.6	+44.5	+45.5	+46.4	+47.3	+48.2	335
26	+39.0	+40.0	+40.9	+41.8	+42.7	+43.6	+44.5	+45.5	+46.4	+47.3	+48.2	334
27	+39.1	+40.0	+40.9	+41.8	+42.7	+43.6	+44.5	+45.5	+46.4	+47.3	+48.2	333
28	+39.2	+40.1	+41.0	+41.9	+42.8	+43.7	+44.6	+45.5	+46.4	+47.3	+48.2	332
29	+39.2	+40.1	+41.9	+41.9	+42.8	+43.7	+44.6	+45.5	+46.4	+47.3	+48.2	331
30	+39.3	+40.2	+41.0	+42.0	+42.9	+43.8	+44.6	+45.5	+46.4	+47.3	+48.2	330
31	+39.4	+40.3	+41.1	+42.0	+42.9	+43.8	+44.6	+45.5	+46.4	+47.3	+48.2	329
32	+39.5	+40.4	+41.2	+42.1	+43.0	+43.9	+44.7	+45.6	+46.5	+47.4	+48.2	328
33	+39.5	+40.4	+41.2	+42.1	+43.0	+43.9	+44.7	+45.6	+46.5	+47.4	+48.2	327
34	+39.6	+40.5	+41.3	+42.2	+43.1	+44.0	+44.8	+45.7	+46.5	+47.4	+48.2	326
35	+39.7	+40.6	+41.4	+42.3	+43.1	+44.0	+44.8	+45.7	+46.5	+47.4	+48.2	325
36	+39.8	+40.7	+41.5	+42.4	+43.2	+44.1	+44.9	+45.8	+46.6	+47.4	+48.2	324
37	+39.9	+40.7	+41.5	+42.4	+43.2	+44.1	+44.9	+45.8	+46.6	+47.4	+48.2	323
38	+40.0	+40.8	+41.6	+42.5	+43.3	+44.2	+45.0	+45.8	+46.6	+47.4	+48.2	322
39	+40.1	+40.9	+41.7	+42.6	+43.4	+44.2	+45.0	+45.8	+46.6	+47.4	+48.2	321
40	+40.2	+41.0	+41.8	+42.7	+43.5	+44.3	+45.1	+45.9	+46.7	+47.5	+48.2	320
41	+40.3	+41.1	+41.9	+42.7	+43.5	+44.3	+45.1	+45.9	+46.7	+47.5	+48.2	319
42	+40.4	+41.2	+42.0	+42.8	+43.6	+44.4	+45.1	+45.9	+46.7	+47.5	+48.2	318
43	+40.5	+41.3	+42.0	+42.8	+43.6	+44.4	+45.2	+45.9	+46.7	+47.5	+48.2	317
44	+40.6	+41.4	+42.1	+42.9	+43.7	+44.5	+45.2	+46.0	+46.8	+47.5	+48.2	316
45	+40.7	+41.5	+42.2	+43.0	+43.8	+44.6	+45.3	+46.1	+46.8	+47.5	+48.2	315
a / h	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	h / a

a \ h	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
45	53.3	52.7	52.2	51.6	51.0	50.3	49.7	49.2	48.7	48.2	47.7	315
46	54.2	53.6	53.1	52.5	51.9	51.3	50.7	50.1	49.6	49.1	48.6	314
47	55.2	54.6	54.0	53.4	52.8	52.2	51.7	51.1	50.5	50.0	49.5	313
48	56.1	55.5	54.9	54.3	53.7	53.1	52.6	52.0	51.4	50.8	50.3	312
49	57.1	56.4	55.8	55.2	54.6	54.0	53.5	52.9	52.3	51.7	51.2	311
50	58.0	57.3	56.7	56.1	55.5	54.9	54.4	53.8	53.2	52.6	52.1	310
51	58.9	58.3	57.7	57.0	56.4	55.8	55.3	54.7	54.1	53.5	53.0	309
52	59.8	59.2	58.6	57.9	57.3	56.7	56.1	55.5	54.9	54.3	53.8	308
53	60.7	60.1	59.5	58.8	58.2	57.6	57.0	56.4	55.8	55.2	54.7	307
54	61.6	61.0	60.4	59.7	59.1	58.5	57.9	57.3	56.7	56.1	55.5	306
55	62.5	61.9	61.3	60.6	60.0	59.4	58.8	58.2	57.6	57.0	56.4	305
56	63.3	62.7	62.1	61.4	60.8	60.2	59.6	59.0	58.4	57.8	57.2	304
57	64.2	63.5	62.9	62.3	61.7	61.1	60.5	59.9	59.3	58.7	58.1	303
58	65.0	64.3	63.7	63.1	62.5	61.9	61.3	60.7	60.1	59.5	58.9	302
59	65.9	65.2	64.6	64.0	63.4	62.8	62.2	61.5	60.9	60.3	59.7	301
60	66.7	66.0	65.4	64.8	64.2	63.6	63.0	62.3	61.7	61.1	60.5	300
61	67.6	66.9	66.3	65.6	65.0	64.4	63.8	63.1	62.5	61.9	61.3	299
62	68.4	67.7	67.1	66.4	65.8	65.2	64.6	63.9	63.3	62.7	62.1	298
63	69.2	68.5	67.9	67.2	66.6	66.0	65.4	64.7	64.1	63.5	62.9	297
64	70.0	69.3	68.7	68.0	67.4	66.8	66.2	65.5	64.9	64.3	63.7	296
65	70.8	70.1	69.5	68.8	68.2	67.6	67.0	66.3	65.7	65.1	64.5	295
66	71.6	70.9	70.3	69.6	69.0	68.4	67.8	67.1	66.5	65.9	65.3	294
67	72.4	71.7	71.1	70.4	69.8	69.2	68.6	67.9	67.3	66.7	66.1	293
68	73.2	72.5	71.9	71.2	70.6	70.0	69.4	68.7	68.1	67.5	66.9	292
69	74.0	73.3	72.7	72.0	71.4	70.8	70.2	69.5	68.9	68.3	67.7	291
70	74.8	74.1	73.5	72.8	72.2	71.6	71.0	70.3	69.7	69.0	68.4	290
71	75.6	74.9	74.3	73.6	73.0	72.4	71.8	71.1	70.5	69.8	69.2	289
72	76.4	75.7	75.1	74.4	73.8	73.1	72.5	71.8	71.2	70.5	69.9	288
73	77.2	76.5	75.9	75.2	74.6	73.9	73.3	72.6	72.0	71.3	70.7	287
74	78.0	77.3	76.6	75.9	75.3	74.6	74.0	73.3	72.7	72.0	71.4	286
75	78.8	78.1	77.4	76.7	76.1	75.4	74.8	74.1	73.5	72.8	72.2	285
76	79.5	78.8	78.[illegible]	77.4	76.8	76.1	75.5	74.8	74.2	73.5	72.9	284
77	80.3	79.6	78.9	78.2	77.6	76.9	76.3	75.6	75.0	74.3	73.7	283
78	81.0	80.4	79.7	79.1	78.4	77.8	77.1	76.4	75.7	75.1	74.4	282
79	81.8	81.2	80.5	79.9	79.2	78.6	77.9	77.2	76.5	75.9	75.2	281
80	82.5	81.9	81.2	80.6	79.9	79.3	78.6	77.9	77.2	76.6	75.9	280
81	83.3	82.7	82.0	81.4	80.7	80.[illegible]	79.4	78.7	78.0	77.4	76.7	279
82	84.0	83.4	82.7	82.1	81.4	80.8	80.1	79.4	78.7	78.1	77.4	278
83	84.8	84.2	83.5	82.9	82.2	81.6	80.9	80.2	79.5	78.9	78.2	277
84	85.5	84.9	84.2	83.6	82.9	82.3	81.6	80.9	80.2	79.6	78.9	276
85	86.3	85.7	85.0	84.4	83.7	83.1	82.4	81.7	81.0	80.4	79.7	275
86	87.0	86.4	85.7	85.1	84.4	83.8	83.1	82.4	81.7	81.1	80.4	274
87	87.8	87.1	86.4	85.8	85.1	84.5	83.8	83.2	82.5	81.9	81.2	273
88	88.5	87.8	87.1	86.5	85.8	85.2	84.5	83.9	83.2	82.6	81.9	272
89	89.3	88.6	87.9	87.3	86.6	86.0	85.3	84.6	83.9	83.3	82.6	271
90	90.0	89.3	88.6	88.0	87.3	86.7	86.0	85.3	84.6	84.0	83.3	270
a \ h	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	h \ a

a \ h	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
45	−28.1	−27.2	−26.4	−25.5	−24.7	−23.8	−23.0	−22.1	−21.3	−20.4	−19.6	315
46	−27.6	−26.7	−25.9	−25.0	−24.2	−23.3	−22.5	−21.6	−20.8	−19.9	−19.1	314
47	−27.1	−26.2	−25.4	−24.5	−23.7	−22.8	−22.0	−21.1	−20.3	−19.4	−18.6	313
48	−26.5	−25.6	−24.8	−23.9	−23.1	−22.2	−21.4	−20.6	−19.7	−18.8	−18.0	312
49	−26.0	−25.1	−24.3	− 23.4	−22.6	−21.7	−20.9	−20.0	−19.2	−18.3	−17.5	311
50	−25.4	−24.5	−23.7	−22.8	−22.0	−21.2	−20.4	−19.5	−18.7	−17.8	−17.0	310
51	−24.8	−23.9	−23.1	−22.3	−21.5	−20.7	−19.9	−19.0	−18.2	−17.3	−16.5	309
52	−24.2	−23.3	−22.5	−21.7	−20.9	−20.1	−19.3	−18.4	−17.6	−16.7	−15.9	308
53	−23.7	−22.8	−22.0	−21.2	−20.4	−19.6	−18.8	−17.9	−17.1	−16.2	−15.4	307
54	−23.1	−22.2	−21.4	−20.6	−19.8	−19.0	−18.2	−17.3	−16.5	−15.7	−14.9	306
55	−22.5	−21.6	−20.8	−20.0	−19.2	−18.4	−17.6	−16.8	−16.0	−15.2	−14.4	305
56	−21.9	−21.0	−20.2	−19.4	−18.6	−17.8	−17.0	−16.2	−15.4	−14.6	−13.8	304
57	−21.3	−20.5	−19.7	−18.9	−18.1	−17.3	−16.5	−15.7	−14.9	−14.1	−13.3	303
58	−20.7	−19.9	−19.1	−18.3	−17.5	−16.7	−15.9	−15.1	−14.3	−13.5	−12.7	302
59	−20.1	−19.3	−18.5	−17.7	−16.9	−16.1	−15.3	−14.5	−13.7	−12.9	−12.1	301
60	−19.5	−18.7	−17.9	−17.1	−16.3	−15.5	−14.7	−13.9	−13.1	−12.3	−11.5	300
61	−18.9	−18.1	−17.3	−16.5	−15.7	−14.9	−14.1	−13.3	−12.5	−11.7	−10.9	299
62	−18.3	−17.5	−16.7	−15.9	−15.1	−14.3	−13.5	−12.7	−11.9	−11.1	−10.3	298
63	−17.7	−16.9	−16.1	−15.3	−14.5	−13.7	−12.9	−12.1	−11.3	−10.5	− 9.7	297
64	−17.0	−16.2	−15.4	−14.6	−13.9	−13.1	−12.3	−11.5	−10.7	− 9.9	− 9.1	296
65	−16.4	−15.6	−14.8	−14.0	−13.3	−12.5	−11.7	−10.9	−10.1	− 9.3	− 8.5	295
66	−15.8	−15.0	−14.2	−13.4	−12.7	−11.9	−11.1	−10.3	− 9.5	− 8.7	− 7.9	294
67	−15.2	−14.4	−13.6	−12.8	−12.1	−11.3	−10.5	− 9.7	− 8.9	− 8.1	− 7.3	293
68	−14.5	−13.7	−12.9	−12.1	−11.4	−10.6	− 9.8	− 9.0	− 8.2	− 7.4	− 6.7	292
69	−13.9	−13.1	−12.3	−11.5	−10.8	−10.0	− 9.2	− 8.4	− 7.6	− 6.8	− 6.1	291
70	−13.2	−12.4	−11.6	−10.8	−10.1	− 9.3	− 8.6	− 7.8	− 7.0	− 6.2	− 5.5	290
71	−12.6	−11.8	−11.0	−10.2	− 9.5	− 8.7	− 8.0	− 7.2	− 6.4	− 5.6	− 4.9	289
72	−11.9	−11.1	−10.3	− 9.5	− 8.8	− 8.0	− 7.3	− 6.5	− 5.7	− 4.9	− 4.2	288
73	−11.3	−10.5	− 9.7	− 8.9	− 8.2	− 7.4	− 6.7	− 5.9	− 5.1	− 4.3	− 3.6	287
74	−10.6	− 9.8	− 9.0	− 8.2	− 7.5	− 6.7	− 6.0	− 5.2	− 4.5	− 3.7	− 3.0	286
75	− 9.9	− 9.1	− 8.4	− 7.6	− 6.9	− 6.1	− 5.4	− 4.6	− 3.9	− 3.1	− 2.4	285
76	− 9.2	− 8.4	− 7.7	− 6.9	− 6.2	− 5.4	− 4.7	− 3.9	− 3.2	− 2.4	− 1.7	284
77	− 8.6	− 7.8	− 7.1	− 6.3	− 5.6	− 4.8	− 4.1	− 3.3	− 2.6	− 1.8	− 1.1	283
78	− 7.9	− 7.1	− 6.4	− 5.6	− 4.9	− 4.1	− 3.4	− 2.6	− 1.9	− 1.2	− 0.4	282
79	− 7.3	− 6.5	− 5.8	− 5.0	− 4.3	− 3.5	− 2.8	− 2.0	− 1.3	− 0.6	+ 0.2	281
80	− 6.6	− 5.8	− 5.1	− 4.3	− 3.6	− 2.8	− 2.1	− 1.4	− 0.6	+ 0.1	+ 0.9	280
81	− 6.0	− 5.2	− 4.5	− 3.7	− 3.0	− 2.2	− 1.5	− 0.7	0.0	+ 0.7	+ 1.5	279
82	− 5.3	− 4.5	− 3.8	− 3.0	− 2.3	− 1.5	− 0.8	0.0	+ 0.7	+ 1.4	+ 2.2	278
83	− 4.7	− 3.9	− 3.2	− 2.4	− 1.7	− 0.9	− 0.2	+ 0.6	+ 1.3	+ 2.0	+ 2.8	277
84	− 4.0	− 3.2	− 2.5	− 1.7	− 1.0	− 0.3	+ 0.5	+ 1.2	+ 2.0	+ 2.7	+ 3.5	276
85	− 3.3	− 2.5	− 1.8	− 1.1	− 0.4	+ 0.3	+ 1.1	+ 1.8	+ 2.6	+ 3.3	+ 4.1	275
86	− 2.7	− 1.9	− 1.2	− 0.5	+ 0.3	+ 1.0	+ 1.8	+ 2.5	+ 3.3	+ 4.0	+ 4.8	274
87	− 2.0	− 1.3	− 0.6	+ 0.1	+ 0.9	+ 1.6	+ 2.4	+ 3.1	+ 3.9	+ 4.6	+ 5.4	273
88	− 1.3	− 0.6	+ 0.1	+ 0.8	+ 1.6	+ 2.3	+ 3.1	+ 3.8	+ 4.6	+ 5.3	+ 6.1	272
89	− 0.6	0.0	+ 0.8	+ 1.5	+ 2.3	+ 3.0	+ 3.8	+ 4.5	+ 5.2	+ 5.9	+ 6.7	271
90	0.0	+ 0.7	+ 1.5	+ 2.2	+ 3.0	+ 3.7	+ 4.5	+ 5.2	+ 5.9	+ 6.6	+ 7.4	270
a / h	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	h / a

h/a	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	h/a
°	°	°	°	°	°	°	°	°	°	°	°	°
45	47.7	47.1	46.6	46.1	45.6	45.1	44.6	44.1	43.6	43.1	42.6	315
46	48.6	48.0	47.5	47.0	46.5	45.9	45.4	44.9	44.4	43.9	43.4	314
47	49.5	48.9	48.4	47.9	47.4	46.8	46.3	45.8	45.3	44.8	44.3	313
48	50.3	49.7	49.2	48.7	48.2	47.6	47.1	46.6	46.1	45.6	45.1	312
49	51.2	50.6	50.1	49.6	49.1	48.5	48.0	47.5	47.0	46.4	45.9	311
50	52.1	51.5	51.0	50.4	49.9	49.3	48.8	48.3	47.8	47.2	46.7	310
51	53.0	52.4	51.9	51.3	50.8	50.2	49.7	49.1	48.6	48.0	47.5	309
52	53.8	53.2	52.7	52.1	51.6	51.0	50.5	49.9	49.4	48.8	48.3	308
53	54.7	54.1	53.6	53.0	52.5	51.9	51.3	50.7	50.2	49.5	49.1	307
54	55.5	54.9	54.4	53.8	53.3	52.7	52.1	51.5	51.0	50.4	49.9	306
55	56.4	55.8	55.2	54.6	54.1	53.5	52.9	52.3	51.8	51.2	50.7	305
56	57.2	56.6	56.0	55.4	54.9	54.3	53.7	53.1	52.6	52.0	51.5	304
57	58.1	57.5	56.9	56.3	55.7	55.1	54.5	53.9	53.4	52.8	52.3	303
58	58.9	58.3	57.7	57.1	56.5	55.9	55.3	54.7	54.2	53.6	53.1	302
59	59.7	59.1	58.5	57.9	57.3	56.7	56.1	55.5	55.0	54.4	53.9	301
60	60.5	59.9	59.3	58.7	58.1	57.5	56.9	56.3	55.8	55.2	54.6	300
61	61.3	60.7	60.1	59.5	58.9	58.3	57.7	57.1	56.6	56.0	55.4	299
62	62.1	61.5	60.9	60.3	59.7	59.1	58.5	57.9	57.3	56.7	56.1	298
63	62.9	62.3	61.7	61.1	60.5	59.9	59.3	58.7	58.1	57.5	56.9	297
64	63.7	63.1	62.5	61.9	61.3	60.6	60.0	59.4	58.8	58.2	57.6	296
65	64.5	63.9	63.3	62.7	62.1	61.4	60.8	60.2	59.6	59.0	58.4	295
66	65.3	64.7	64.1	63.5	62.9	62.2	61.6	60.9	60.3	59.7	59.1	294
67	66.1	65.5	64.9	64.3	63.7	63.0	62.4	61.7	61.1	60.5	59.9	293
68	66.9	66.2	65.6	65.0	64.4	63.7	63.1	62.4	61.8	61.2	60.6	292
69	67.7	67.0	66.4	65.8	65.2	64.5	63.9	63.2	62.6	62.0	61.4	291
70	68.4	67.7	67.1	66.5	65.9	65.2	64.6	63.9	63.3	62.7	62.1	290
71	69.2	68.5	67.9	67.3	66.7	66.0	65.4	64.7	64.1	63.5	62.9	289
72	69.9	69.2	68.6	68.0	67.4	66.7	66.1	65.4	64.8	64.2	63.6	288
73	70.7	70.0	69.4	68.8	68.2	67.5	66.9	66.2	65.6	64.9	64.3	287
74	71.4	70.7	70.1	69.5	68.9	68.2	67.6	66.9	66.3	65.6	65.0	286
75	72.2	71.5	70.9	70.3	69.7	69.0	68.4	67.7	67.1	66.4	65.7	285
76	72.9	72.2	71.6	71.0	70.4	69.7	69.1	68.4	67.8	67.1	66.4	284
77	73.7	73.0	72.4	71.8	71.2	70.5	69.9	62.2	68.6	67.9	67.2	283
78	74.4	73.8	73.1	72.5	71.9	71.3	70.6	70.0	69.3	68.6	67.9	282
79	75.2	74.6	73.9	73.3	72.6	72.0	71.3	70.7	70.0	69.3	68.6	281
80	75.9	75.3	74.6	74.0	73.3	72.7	72.0	71.4	70.7	70.0	69.3	280
81	76.7	76.1	75.4	74.8	74.1	73.5	72.8	72.1	71.4	70.7	70.0	279
82	77.4	76.8	76.1	75.5	74.8	74.2	73.5	72.8	72.1	71.4	70.7	278
83	78.2	77.6	76.9	76.3	75.6	74.9	74.2	73.5	72.8	72.1	71.4	277
84	78.9	78.3	77.6	77.0	76.3	75.6	74.9	74.2	73.5	72.8	72.1	276
85	79.7	79.1	78.4	77.7	77.0	76.3	75.6	75.0	74.3	73.6	72.9	275
86	80.4	79.8	79.1	78.4	77.7	77.0	76.3	75.7	75.0	74.3	73.6	274
87	81.2	80.5	79.8	79.1	78.4	77.7	77.0	76.4	75.7	75.0	74.3	273
88	81.9	81.2	80.5	79.8	79.1	78.4	77.8	77.1	76.4	75.7	75.0	272
89	82.6	81.9	81.2	80.6	79.9	79.2	78.5	77.8	77.1	76.4	75.7	271
90	83.3	82.6	81.9	81.3	80.6	79.9	79.2	78.5	77.8	77.1	76.4	270
a/h	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	h/a

a \ h	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
45	−19.6	−18.7	−17.8	−16.9	−16.0	−15.1	−14.3	−13.4	−12.5	−11.6	−10.7	315
46	−19.1	−18.2	−17.3	−16.4	−15.6	−14.7	−13.9	−13.0	−12.1	−11.2	−10.3	314
47	−18.6	−17.7	−16.8	−15.9	−15.1	−14.2	−13.4	−12.5	−11.6	−10.7	− 9.9	313
48	−18.0	−17.1	−16.3	−15.4	−14.6	−13.7	−12.9	−12.0	−11.1	−10.2	− 9.4	312
49	−17.5	−16.6	−15.8	−14.9	−14.1	−13.2	−12.4	−11.5	−10.7	− 9.8	− 9.0	311
50	−17.0	−16.1	−15.3	−14.4	−13.6	−12.7	−11.9	−11.0	−10.2	− 9.3	− 8.5	310
51	−16.5	−15.6	−14.8	−13.9	−13.1	−12.2	−11.4	−10.5	− 9.7	− 8.9	− 8.0	309
52	−15.9	−15.0	−14.2	−13.3	−12.5	−11.7	−10.9	−10.0	− 9.2	− 8.3	− 7.5	308
53	−15.4	−14.5	−13.7	−12.8	−12.0	−11.2	−10.4	− 9.5	− 8.7	− 7.8	− 7.0	307
54	−14.9	−14.0	−13.2	−12.3	−11.5	−10.7	− 9.9	− 9.0	− 8.2	− 7.3	− 6.5	306
55	−14.4	−13.5	−12.7	−11.8	−11.0	−10.2	− 9.4	− 8.5	− 7.7	− 6.8	− 6.0	305
56	−13.8	−12.9	−12.1	−11.2	−10.4	− 9.6	− 8.8	− 7.9	− 7.1	− 6.2	− 5.4	304
57	−13.3	−12.4	−11.6	−10.7	− 9.9	− 9.1	− 8.3	− 7.4	− 6.6	− 5.7	− 4.9	303
58	−12.7	−11.8	−11.0	−10.1	− 9.3	− 8.5	− 7.7	− 6.8	− 6.0	− 5.2	− 4.4	302
59	−12.1	−11.2	−10.4	− 9.6	− 8.8	− 8.0	− 7.2	− 6.3	− 5.5	− 4.7	− 3.9	301
60	−11.5	−10.6	− 9.8	− 9.0	− 8.2	− 7.4	− 6.6	− 5.7	− 4.9	− 4.1	− 3.3	300
61	−10.9	−10.1	− 9.3	− 8.5	− 7.7	− 6.9	− 6.1	− 5.2	− 4.4	− 3.6	− 2.8	299
62	−10.3	− 9.5	− 8.7	− 7.9	− 7.1	− 6.3	− 5.5	− 4.6	− 3.8	− 3.0	− 2.2	298
63	− 9.7	− 8.9	− 8.1	− 7.3	− 6.5	− 5.7	− 4.9	− 4.1	− 3.3	− 2.5	− 1.7	297
64	− 9.1	− 8.3	− 7.5	− 6.7	− 5.9	− 5.1	− 4.3	− 3.5	− 2.7	− 1.9	− 1.1	296
65	− 8.5	− 7.7	− 6.9	− 6.1	− 5.3	− 4.5	− 3.7	− 2.9	− 2.1	− 1.3	− 0.6	295
66	− 7.9	− 7.1	− 6.3	− 5.5	− 4.7	− 3.9	− 3.1	− 2.3	− 1.5	− 0.8	0.0	294
67	− 7.3	− 6.5	− 5.7	− 4.9	− 4.1	− 3.3	− 2.5	− 1.7	− 0.9	− 0.2	+ 0.6	293
68	− 6.7	− 5.9	− 5.1	− 4.3	− 3.5	− 2.7	− 1.9	− 1.1	− 0.3	+ 0.4	+ 1.2	292
69	− 6.1	− 5.3	− 4.5	− 3.7	− 2.9	− 2.1	− 1.3	− 0.6	+ 0.2	+ 0.9	+ 1.7	291
70	− 5.5	− 4.7	− 3.9	− 3.1	− 2.3	− 1.5	− 0.7	0.0	+ 0.8	+ 1.5	+ 2.3	290
71	− 4.9	− 4.1	− 3.3	− 2.5	− 1.7	− 0.9	− 0.2	+ 0.6	+ 1.4	+ 2.1	+ 2.9	289
72	− 4.2	− 3.4	− 2.6	− 1.8	− 1.1	− 0.3	+ 0.4	+ 1.2	+ 2.0	+ 2.7	+ 3.5	288
73	− 3.6	− 2.8	− 2.0	− 1.2	− 0.5	+ 0.3	+ 1.0	+ 1.8	+ 2.6	+ 3.3	+ 4.1	287
74	− 3.0	− 2.2	− 1.4	− 0.6	+ 0.1	+ 0.9	+ 1.6	+ 2.4	+ 3.2	+ 3.9	+ 4.7	286
75	− 2.4	− 1.6	− 0.8	0.0	+ 0.7	+ 1.4	+ 2.2	+ 3.0	+ 3.8	+ 4.5	+ 5.3	285
76	− 1.7	− 1.0	− 0.2	+ 0.6	+ 1.3	+ 2.0	+ 2.8	+ 3.6	+ 4.4	+ 5.1	+ 5.9	284
77	− 1.1	− 0.4	+ 0.4	+ 1.2	+ 1.9	+ 2.6	+ 3.4	+ 4.2	+ 5.0	+ 5.7	+ 6.5	283
78	− 0.4	+ 0.3	+ 1.1	+ 1.8	+ 2.6	+ 3.3	+ 4.1	+ 4.8	+ 5.6	+ 6.3	+ 7.1	282
79	+ 0.2	+ 0.9	+ 1.7	+ 2.4	+ 3.2	+ 3.9	+ 4.7	+ 5.4	+ 6.2	+ 6.9	+ 7.7	281
80	+ 0.9	+ 1.6	+ 2.4	+ 3.1	+ 3.9	+ 4.6	+ 5.4	+ 6.1	+ 6.9	+ 7.6	+ 8.4	280
81	+ 1.5	+ 2.2	+ 3.0	+ 3.7	+ 4.5	+ 5.2	+ 6.0	+ 6.7	+ 7.5	+ 8.2	+ 9.0	279
82	+ 2.2	+ 2.9	+ 3.7	+ 4.4	+ 5.2	+ 5.9	+ 6.7	+ 7.4	+ 8.2	+ 8.9	+ 9.6	278
83	+ 2.8	+ 3.5	+ 4.3	+ 5.0	+ 5.8	+ 6.5	+ 7.3	+ 8.0	+ 8.8	+ 9.5	+10.2	277
84	+ 3.5	+ 4.2	+ 5.0	+ 5.7	+ 6.5	+ 7.2	+ 8.0	+ 8.7	+ 9.5	+10.2	+10.9	276
85	+ 4.1	+ 4.8	+ 5.6	+ 6.3	+ 7.1	+ 7.8	+ 8.6	+ 9.3	+10.1	+10.8	+11.5	275
86	+ 4.8	+ 5.5	+ 6.3	+ 7.0	+ 7.8	+ 8.5	+ 9.2	+ 9.9	+10.7	+11.4	+12.2	274
87	+ 5.4	+ 6.1	+ 6.9	+ 7.6	+ 8.4	+ 9.1	+ 9.8	+10.5	+11.3	+12.0	+12.8	273
88	+ 6.1	+ 6.8	+ 7.6	+ 8.3	+ 9.1	+ 9.8	+10.5	+11.2	+12.0	+12.7	+13.5	272
89	+ 6.7	+ 7.4	+ 8.2	+ 8.9	+ 9.7	+10.4	+11.2	+11.9	+12.6	+13.3	+14.1	271
90	+ 7.4	+ 8.1	+ 8.9	+ 9.6	+10.4	+11.1	+11.9	+12.6	+13.3	+14.0	+14.8	270
a \ h	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	h \ a

^h_a	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	^h_a
°	°	°	°	°	°	°	°	°	°	°	°	°
45	42.6	42.1	41.6	41.1	40.6	40.1	39.7	39.2	38.8	38.3	37.9	315
46	43.4	42.9	42.4	41.9	41.4	40.9	40.5	40.0	39.6	39.1	38.6	314
47	44.3	43.7	43.2	42.7	42.2	41.7	41.3	40.8	40.4	39.9	39.4	313
48	45.1	44.5	44.0	43.5	43.0	42.5	42.1	41.6	41.1	40.6	40.1	312
49	45.9	45.3	44.8	44.3	43.8	43.3	42.9	42.4	41.9	41.4	40.9	311
50	46.7	46.1	45.6	45.1	44.6	44.1	43.6	43.1	42.6	42.1	41.6	310
51	47.5	46.9	46.4	45.9	45.4	44.9	44.4	43.9	43.4	42.9	42.4	309
52	48.3	47.7	47.2	46.7	46.2	45.7	45.2	44.6	44.1	43.6	43.1	308
53	49.1	48.5	48.0	47.5	47.0	46.5	46.0	45.4	44.9	44.4	43.9	307
54	49.9	49.3	48.8	48.3	47.8	47.2	46.7	46.1	45.6	45.1	44.6	306
55	50.7	50.1	49.6	49.1	48.6	48.0	47.5	46.9	46.4	45.8	45.3	305
56	51.5	50.9	50.4	49.8	49.3	48.7	48.2	47.6	47.1	46.5	46.0	304
57	52.3	51.7	51.2	50.6	50.1	49.5	49.0	48.4	47.9	47.3	46.8	303
58	53.1	52.5	51.9	51.3	50.8	50.2	49.7	49.1	48.6	48.0	47.5	302
59	53.9	53.3	52.7	52.1	51.6	51.0	50.5	49.9	49.3	48.7	48.2	301
60	54.6	54.0	53.4	52.8	52.3	51.7	51.2	50.6	50.0	49.4	48.9	300
61	55.4	54.8	54.2	53.6	53.1	52.5	51.9	51.3	50.7	50.1	49.6	299
62	56.1	55.5	54.9	54.3	53.8	53.2	52.6	52.0	51.4	50.8	50.3	298
63	56.8	56.3	55.7	55.1	54.5	53.9	53.3	52.7	52.1	51.5	51.0	297
64	57.6	57.0	56.4	55.8	55.2	54.6	54.0	53.4	52.8	52.2	51.6	296
65	58.4	57.8	57.2	56.6	56.0	55.4	54.8	54.2	53.6	52.9	52.3	295
66	59.1	58.5	57.9	57.3	56.7	56.1	55.5	54.9	54.3	53.6	53.0	294
67	59.9	59.2	58.6	58.0	57.4	56.8	56.2	55.6	55.0	54.3	53.7	293
68	60.6	59.9	59.3	58.7	58.1	57.5	56.9	56.3	55.7	55.0	54.4	292
69	61.4	60.7	60.1	59.5	58.9	58.2	57.6	57.0	56.4	55.7	55.1	291
70	62.1	61.4	60.8	60.2	59.6	58.9	58.3	57.7	57.1	56.4	55.8	290
71	62.9	62.2	61.6	60.9	60.3	59.6	59.0	58.4	57.8	57.1	56.5	289
72	63.6	62.9	62.3	61.6	61.0	60.3	59.7	59.0	58.4	57.7	57.1	288
73	64.3	63.6	63.0	62.3	61.7	61.0	60.4	59.7	59.1	58.4	57.8	287
74	65.0	64.3	63.7	63.0	62.4	61.7	61.1	60.4	59.8	59.1	58.5	286
75	65.7	65.0	64.4	63.7	63.1	62.4	61.8	61.1	60.5	59.8	59.2	285
76	66.4	65.7	65.1	64.4	63.8	63.1	62.5	61.8	61.1	60.4	59.8	284
77	67.2	66.5	65.8	65.1	64.5	63.8	63.2	62.5	61.8	61.1	60.5	283
78	67.9	67.2	66.5	65.9	65.2	64.6	63.9	63.2	62.5	61.8	61.1	282
79	68.6	67.9	67.2	66.6	65.9	65.3	64.6	63.9	63.2	62.5	61.8	281
80	69.3	68.6	67.9	67.3	66.6	65.9	65.2	64.5	63.8	63.1	62.4	280
81	70.0	69.3	68.6	68.0	67.3	66.6	65.9	65.2	64.5	63.8	63.1	279
82	70.7	70.0	69.3	68.7	68.0	67.3	66.6	65.9	65.2	64.5	63.8	278
83	71.4	70.7	70.0	69.4	68.7	68.0	67.3	66.6	65.9	65.2	64.5	277
84	72.1	71.4	70.7	70.1	69.4	68.7	68.0	67.3	66.5	65.8	65.1	276
85	72.9	72.2	71.5	70.8	70.1	69.4	68.7	68.0	67.2	66.5	65.8	275
86	73.6	72.9	72.2	71.5	70.8	70.1	69.4	68.7	67.9	67.2	66.4	274
87	74.3	73.6	72.9	72.2	71.5	70.8	70.1	69.4	68.6	67.9	67.1	273
88	75.0	74.3	73.6	72.9	72.1	71.4	70.7	70.0	69.2	68.5	67.7	272
89	75.7	75.0	74.3	73.6	72.8	72.1	71.4	70.7	69.9	69.2	68.4	271
90	76.4	75.7	74.9	74.2	73.5	72.8	72.0	71.3	70.5	69.8	69.0	270
^a_h	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	^a_h

a \ h	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
45	−10.7	− 9.8	− 9.0	− 8.1	− 7.3	− 6.4	− 5.5	− 4.6	− 3.8	− 2.9	− 2.0	315
46	−10.3	− 9.4	− 8.6	− 7.0	− 6.9	− 6.0	− 5.1	− 4.2	− 3.4	− 2.5	− 1.6	314
47	− 9.9	− 9.0	− 8.2	− 7.3	− 6.5	− 5.6	− 4.7	− 3.8	− 3.0	− 2.1	− 1.2	313
48	− 9.4	− 8.5	− 7.7	− 6.8	− 6.0	− 5.1	− 4.3	− 3.4	− 2.6	− 1.7	− 0.8	312
49	− 9.0	− 8.1	− 7.3	− 6.4	− 5.6	− 4.7	− 3.9	− 3.0	− 2.2	− 1.3	− 0.4	311
50	− 8.5	− 7.6	− 6.8	− 5.9	− 5.1	− 4.2	− 3.4	− 2.5	− 1.7	− 0.8	+ 0.1	310
51	− 8.0	− 7.1	− 6.3	− 5.4	− 4.6	− 3.7	− 2.9	− 2.0	− 1.2	− 0.3	+ 0.5	309
52	− 7.5	− 6.6	− 5.8	− 4.9	− 4.1	− 3.2	− 2.4	− 1.5	− 0.7	+ 0.2	+ 1.0	308
53	− 7.0	− 6.1	− 5.3	− 4.5	− 3.7	− 2.8	− 2.0	− 1.1	− 0.3	+ 0.6	+ 1.4	307
54	− 6.5	− 5.6	− 4.8	− 4.0	− 3.2	− 2.3	− 1.5	− 0.7	+ 0.2	+ 1.1	+ 1.9	306
55	− 6.0	− 5.1	− 4.3	− 3.5	− 2.7	− 1.8	− 1.0	− 0.2	+ 0.7	+ 1.5	+ 2.4	305
56	− 5.4	− 4.6	− 3.8	− 3.0	− 2.2	− 1.4	− 0.5	+ 0.3	+ 1.2	+ 2.0	+ 2.9	304
57	− 4.9	− 4.1	− 3.3	− 2.5	− 1.7	− 1.0	0.0	+ 0.8	+ 1.7	+ 2.5	+ 3.4	303
58	− 4.4	− 3.6	− 2.8	− 2.0	− 1.2	− 0.3	+ 0.5	+ 1.4	+ 2.2	+ 3.0	+ 3.9	302
59	− 3.9	− 3.1	− 2.3	− 1.4	− 0.6	+ 0.2	+ 1.0	+ 1.1	+ 2.7	+ 3.5	+ 4.4	301
60	− 3.3	− 2.5	− 1.7	− 0.9	− 0.1	+ 0.7	+ 1.6	+ 2.4	+ 3.2	+ 4.0	+ 4.9	300
61	− 2.8	− 2.0	− 1.2	− 0.3	+ 0.5	+ 1.3	+ 2.1	+ 2.9	+ 3.7	+ 4.5	+ 5.4	299
62	− 2.2	− 1.4	− 0.6	+ 0.2	+ 1.0	+ 1.8	+ 2.6	+ 3.4	+ 4.2	+ 5.0	+ 5.9	298
63	− 1.7	− 0.9	− 0.1	+ 0.7	+ 1.5	+ 2.3	+ 3.1	+ 3.9	+ 4.7	+ 5.5	+ 6.4	297
64	− 1.1	− 0.3	+ 0.5	+ 1.3	+ 2.1	+ 2.9	+ 3.7	+ 4.5	+ 5.3	+ 6.1	+ 6.9	296
65	− 0.6	+ 0.2	+ 1.0	+ 1.8	+ 2.6	+ 3.4	+ 4.2	+ 5.0	+ 5.8	+ 6.6	+ 7.4	295
66	0.0	+ 0.8	+ 1.6	+ 2.4	+ 3.2	+ 4.0	+ 4.8	+ 5.5	+ 6.3	+ 7.1	+ 7.9	294
67	+ 0.6	+ 1.4	+ 2.2	+ 2.9	+ 3.7	+ 4.5	+ 5.3	+ 6.0	+ 6.8	+ 7.6	+ 8.5	293
68	+ 1.2	+ 2.0	+ 2.8	+ 3.5	+ 4.3	+ 5.1	+ 5.9	+ 6.6	+ 7.4	+ 8.2	+ 9.0	292
69	+ 1.7	+ 2.5	+ 3.3	+ 4.0	+ 4.8	+ 5.6	+ 6.4	+ 7.1	+ 7.9	+ 8.7	+ 9.6	291
70	+ 2.3	+ 3.1	+ 3.9	+ 4.6	+ 5.4	+ 6.2	+ 7.0	+ 7.7	+ 8.5	+ 9.3	+10.1	290
71	+ 2.9	+ 3.7	+ 4.5	+ 5.2	+ 6.0	+ 6.8	+ 7.6	+ 8.3	+ 9.1	+ 9.9	+10.7	289
72	+ 3.5	+ 4.3	+ 5.1	+ 5.8	+ 6.6	+ 7.4	+ 8.2	+ 8.9	+ 9.7	+10.4	+11.2	288
73	+ 4.1	+ 4.9	+ 5.7	+ 6.4	+ 7.2	+ 7.9	+ 8.7	+ 9.4	+10.2	+11.0	+11.8	287
74	+ 4.7	+ 5.5	+ 6.3	+ 7.0	+ 7.8	+ 8.5	+ 9.3	+10.0	+10.8	+11.5	+12.3	286
75	+ 5.3	+ 6.1	+ 6.9	+ 7.6	+ 8.4	+ 9.1	+ 9.9	+10.6	+11.4	+12.1	+12.9	285
76	+ 5.9	+ 6.7	+ 7.5	+ 8.2	+ 9.0	+ 9.7	+10.5	+11.2	+12.0	+12.7	+13.5	284
77	+ 6.5	+ 7.3	+ 8.1	+ 8.8	+ 9.6	+10.3	+11.1	+11.8	+12.6	+13.3	+14.1	283
78	+ 7.1	+ 7.9	+ 8.7	+ 9.4	+10.2	+10.9	+11.7	+12.4	+13.2	+13.9	+14.7	282
79	+ 7.7	+ 8.5	+ 9.3	+10.0	+10.8	+11.5	+12.3	+13.0	+13.8	+14.5	+15.3	281
80	+ 8.4	+ 9.1	+ 9.9	+10.6	+11.4	+12.1	+12.9	+13.6	+14.4	+15.1	+15.9	280
81	+ 9.0	+ 9.7	+10.5	+11.2	+12.0	+12.7	+13.5	+14.2	+15.0	+15.7	+16.4	279
82	+ 9.6	+10.3	+11.1	+11.8	+12.6	+13.3	+14.1	+14.8	+15.6	+16.3	+17.0	278
83	+10.2	+10.9	+11.7	+12.4	+13.2	+13.9	+14.7	+15.4	+16.2	+16.9	+17.6	277
84	+10.6	+11.6	+12.4	+13.1	+13.9	+14.6	+15.4	+16.1	+16.8	+17.5	+18.2	276
85	+11.5	+12.2	+13.0	+13.7	+14.5	+15.2	+16.0	+16.7	+17.4	+18.1	+18.8	275
86	+12.2	+12.9	+13.7	+14.4	+15.1	+15.8	+16.6	+17.3	+18.0	+18.7	+19.4	274
87	+12.8	+13.5	+14.3	+15.0	+15.7	+16.4	+17.2	+17.9	+18.6	+19.3	+20.0	273
88	+13.5	+14.2	+15.0	+15.7	+16.4	+17.1	+17.8	+18.5	+19.2	+19.9	+20.6	272
89	+14.1	+14.8	+15.6	+16.3	+17.0	+17.7	+18.4	+19.1	+19.8	+20.5	+21.2	271
90	+14.8	+15.5	+16.2	+16.9	+17.7	+18.4	+19.1	+19.8	+20.5	+21.2	+21.9	270
a \ h	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	h \ a

a \ h	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
45	37.9	37.4	36.9	36.5	36.0	35.5	35.0	34.5	34.0	33.6	33.1	315
46	38.6	38.1	37.6	37.2	36.7	36.2	35.7	35.2	34.7	34.3	33.8	314
47	39.4	38.9	38.4	37.9	37.4	36.9	36.4	35.9	35.4	35.0	34.5	313
48	40.1	39.6	39.1	38.6	38.1	37.6	37.1	36.6	36.1	35.6	35.1	312
49	40.9	40.4	39.9	39.4	38.9	38.4	37.8	37.3	36.8	36.3	35.8	311
50	41.6	41.1	40.6	40.1	39.6	39.1	38.5	38.0	37.5	37.0	36.4	310
51	42.4	41.9	41.3	40.8	40.3	39.8	39.2	38.7	38.2	37.7	37.1	309
52	43.1	42.6	42.0	41.5	41.0	40.5	39.9	39.4	38.8	38.3	37.7	308
53	43.9	43.4	42.8	42.3	41.7	41.2	40.6	40.1	39.5	39.0	38.4	307
54	44.6	44.1	43.5	43.0	42.4	41.9	41.3	40.8	40.2	39.6	39.0	306
55	45.3	44.8	44.2	43.7	43.1	42.6	42.0	41.5	40.9	40.3	39.7	305
56	46.0	45.5	44.9	44.4	43.8	43.2	42.6	42.1	41.5	40.9	40.3	304
57	46.8	46.2	45.6	45.1	44.5	43.9	43.3	42.8	42.2	41.6	41.0	303
58	47.5	46.9	46.3	45.8	45.2	44.6	44.0	43.4	42.8	42.2	41.6	302
59	48.2	47.6	47.0	46.5	45.9	45.3	44.7	44.1	43.5	42.9	42.3	301
60	48.9	48.3	47.7	47.1	46.5	45.9	45.3	44.7	44.1	43.5	42.9	300
61	49.6	49.0	48.4	47.8	47.2	46.6	46.0	45.4	44.8	44.2	43.6	299
62	50.3	49.7	49.1	48.5	47.9	47.3	46.6	46.0	45.4	44.8	44.2	298
63	51.0	50.4	49.8	49.2	48.6	48.0	47.3	46.7	46.1	45.5	44.8	297
64	51.6	51.0	50.4	49.8	49.2	48.6	47.9	47.3	46.7	46.1	45.4	296
65	52.3	51.7	51.1	50.5	49.9	49.3	48.6	48.0	47.4	46.8	46.1	295
66	53.0	52.4	51.8	51.2	50.5	49.9	49.2	48.6	48.0	47.4	46.7	294
67	53.7	53.1	52.5	51.9	51.2	50.6	49.9	49.3	48.6	48.0	47.3	293
68	54.4	53.8	53.1	52.5	51.8	51.2	50.5	49.9	49.2	48.6	47.9	292
69	55.1	54.5	53.8	53.2	52.5	51.9	51.2	50.6	49.9	49.2	48.5	291
70	55.8	55.2	54.5	53.9	53.2	52.5	51.8	51.2	50.5	49.8	49.1	290
71	56.5	55.9	55.2	54.6	53.9	53.2	52.5	51.8	51.1	50.4	49.7	289
72	57.1	56.5	55.8	55.2	54.5	53.8	53.1	52.4	51.7	51.0	50.3	288
73	57.8	57.2	56.5	55.9	55.2	54.5	53.8	53.1	52.4	51.7	50.9	287
74	58.5	57.8	57.1	56.5	55.8	55.1	54.4	53.7	53.0	52.3	51.5	286
75	59.2	58.5	57.8	57.1	56.4	55.7	55.0	54.3	53.6	52.9	52.1	285
76	59.8	59.1	58.4	57.7	57.0	56.3	55.6	54.9	54.2	53.5	52.7	284
77	60.5	59.8	59.1	58.4	57.7	57.0	56.3	55.6	54.8	54.1	53.3	283
78	61.1	60.4	59.7	59.0	58.3	57.6	56.9	56.2	55.4	54.7	53.9	282
79	61.8	61.1	60.4	59.7	59.0	58.3	57.5	56.8	56.0	55.3	54.5	281
80	62.4	61.7	61.0	60.3	59.6	58.9	58.1	57.4	56.6	55.8	55.0	280
81	63.1	62.4	61.7	61.0	60.2	59.5	58.7	58.0	57.2	56.4	55.6	279
82	63.8	63.1	62.3	61.6	60.8	60.1	59.3	58.6	57.8	57.0	56.2	278
83	64.5	63.8	63.0	62.3	61.5	60.7	59.9	59.2	58.4	57.6	56.8	277
84	65.1	64.4	63.6	62.9	62.1	61.3	60.5	59.7	58.9	58.1	57.3	276
85	65.8	65.1	64.3	63.5	62.7	61.9	61.1	60.3	59.5	58.7	57.9	275
86	66.4	65.7	64.9	64.1	63.3	62.5	61.7	60.9	60.1	59.3	58.5	274
87	67.1	66.3	65.5	64.7	63.9	63.1	62.3	61.5	60.7	59.9	59.1	273
88	67.7	66.9	66.1	65.3	64.5	63.7	62.9	62.1	61.3	60.5	59.6	272
89	68.4	67.6	66.8	66.0	65.2	64.4	63.6	62.8	61.9	61.1	60.2	271
90	69.0	68.2	67.4	66.6	65.8	65.0	64.2	63.4	62.5	61.7	60.8	270
a \ h	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	h \ a

a h	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	h a
°	°	°	°	°	°	°	°	°	°	°	°	°
45	− 2.0	− 1.0	− 0.2	+ 0.7	+ 1.6	+ 2.4	+ 3.3	+ 4.1	+ 5.0	+ 5.8	+ 6.7	315
46	− 1.6	− 0.7	+ 0.2	+ 1.1	+ 2.0	+ 2.8	+ 3.7	+ 4.5	+ 5.4	+ 6.2	+ 7.1	314
47	− 1.2	− 0.3	+ 0.6	+ 1.5	+ 2.4	+ 3.2	+ 4.1	+ 4.9	+ 5.8	+ 6.6	+ 7.5	313
48	− 0.8	+ 0.1	+ 1.0	+ 1.9	+ 2.8	+ 3.6	+ 4.5	+ 5.3	+ 6.2	+ 7.0	+ 7.9	312
49	− 0.4	+ 0.5	+ 1.4	+ 2.3	+ 3.2	+ 4.1	+ 4.9	+ 5.8	+ 6.6	+ 7.5	+ 8.3	311
50	+ 0.1	+ 1.0	+ 1.8	+ 2.7	+ 3.6	+ 4.5	+ 5.3	+ 6.2	+ 7.0	+ 7.9	+ 8.7	310
51	+ 0.5	+ 1.4	+ 2.2	+ 3.1	+ 4.0	+ 4.9	+ 5.7	+ 6.6	+ 7.4	+ 8.3	+ 9.1	309
52	+ 1.0	+ 1.9	+ 2.7	+ 3.6	+ 4.4	+ 5.3	+ 6.1	+ 7.0	+ 7.8	+ 8.7	+ 9.5	308
53	+ 1.4	+ 2.3	+ 3.1	+ 4.0	+ 4.8	+ 5.7	+ 6.5	+ 7.4	+ 8.2	+ 9.1	+ 9.9	307
54	+ 1.9	+ 2.8	+ 3.6	+ 4.5	+ 5.3	+ 6.1	+ 6.9	+ 7.8	+ 8.6	+ 9.5	+10.3	306
55	+ 2.4	+ 3.2	+ 4.0	+ 4.9	+ 5.7	+ 6.5	+ 7.3	+ 8.2	+ 9.0	+ 9.9	+10.7	305
56	+ 2.9	+ 3.7	+ 4.5	+ 5.4	+ 6.2	+ 7.0	+ 7.8	+ 8.7	+ 9.5	+10.4	+11.2	304
57	+ 3.4	+ 4.2	+ 5.0	+ 5.8	+ 6.6	+ 7.4	+ 8.2	+ 9.1	+ 9.9	+10.8	+11.6	303
58	+ 3.9	+ 4.7	+ 5.5	+ 6.3	+ 7.1	+ 7.9	+ 8.7	+ 9.6	+10.4	+11.2	+12.0	302
59	+ 4.4	+ 5.2	+ 6.0	+ 6.8	+ 7.6	+ 8.4	+ 9.2	+10.0	+10.8	+11.6	+12.4	301
60	+ 4.9	+ 5.7	+ 6.5	+ 7.3	+ 8.1	+ 8.9	+ 9.7	+10.5	+11.3	+12.1	+12.9	300
61	+ 5.4	+ 6.2	+ 7.0	+ 7.8	+ 8.6	+ 9.4	+10.1	+10.9	+11.7	+12.5	+13.3	299
62	+ 5.9	+ 6.7	+ 7.5	+ 8.3	+ 9.1	+ 9.9	+10.6	+11.4	+12.2	+13.0	+13.8	298
63	+ 6.4	+ 7.2	+ 8.0	+ 8.8	+ 9.6	+10.4	+11.1	+11.9	+12.7	+13 5	+14.3	297
64	+ 6.9	+ 7.7	+ 8.5	+ 9.3	+10.1	+10.9	+11.6	+12.4	+13.2	+14.0	+14.8	296
65	+ 7.4	+ 8.2	+ 9.0	+ 9.8	+10.6	+11.4	+12.1	+12.9	+13.7	+14.5	+15.2	295
66	+ 7.9	+ 8.7	+ 9.5	+10.3	+11.1	+11.9	+12.6	+13.4	+14.2	+15.0	+15.7	294
67	+ 8.4	+ 9.2	+10.0	+10.8	+11.6	+12.4	+13.1	+13.9	+14.7	+15.5	+16.2	293
68	+ 9.0	+ 9.8	+10.6	+11.4	+12.2	+13.0	+13.7	+14.5	+15.2	+16.0	+16.7	292
69	+ 9.5	+10.3	+11.1	+11.9	+12.7	+13.5	+14.2	+15.0	+15.7	+16.5	+17.2	291
70	+10.1	+10.8	+11.6	+12.4	+13.2	+14.0	+14.7	+15.5	+16.2	+17.0	+17.7	290
71	+10.6	+11.4	+12.1	+12.9	+13.7	+14.5	+15.2	+16.0	+16.7	+17.5	+18.2	289
72	+11.2	+12.0	+12.7	+13.5	+14.2	+15.0	+15.8	+16.6	+17.3	+18.1	+18.8	288
73	+11.7	+12.5	+13.2	+14.0	+14.7	+15.5	+16.3	+17.1	+17.8	+18.6	+19.3	287
74	+12.3	+13.1	+13.8	+14.6	+15.3	+16.1	+16.8	+17.6	+18.3	+19.1	+19.8	286
75	+12.9	+13.7	+14.4	+15.2	+15.9	+16.6	+17.3	+18.1	+18.8	+19.6	+20.3	285
76	+13.5	+14.3	+15.0	+15.8	+16.5	+17.2	+17.9	+18.7	+19.4	+20.1	+20.8	284
77	+14.1	+14.8	+15.5	+16.3	+17.0	+17.7	+18.4	+19.2	+19.9	+20.6	+21.3	283
78	+14 7	+15.4	+16.1	+16.9	+17.6	+18.3	+19.0	+19.8	+20.5	+21.2	+21.9	282
79	+15.3	+16.0	+16.7	+17.5	+18.2	+18.9	+19.6	+20.3	+21.0	+21.7	+22.4	281
80	+15.9	+16.6	+17.3	+18.1	+18.8	+19.5	+20.2	+20.9	+21.6	+22.3	+23.0	280
81	+16.4	+17.1	+17.8	+18.6	+19.3	+20.0	+20.7	+21.4	+22.1	+22.8	+23.5	279
82	+17.0	+17.7	+18.4	+19.2	+19.9	+20.6	+21.3	+22.0	+22.7	+23.4	+24.1	278
83	+17.6	+18.3	+19.0	+19.7	+20.4	+21.1	+21.8	+22.5	+23.2	+23.9	+24.6	277
84	+18.2	+18.9	+19.6	+20.3	+21.0	+21.7	+22.4	+23.1	+23.8	+24.5	+25.2	276
85	+18.8	+19.5	+20.2	+20.9	+21.6	+22.3	+23.0	+23.7	+24.4	+25.1	+25.7	275
86	+19.4	+20.1	+20.8	+21.5	+22.2	+22.9	+23.6	+24.3	+25.0	+25.7	+26.3	274
87	+20.0	+20.7	+21.4	+22.1	+22.8	+23.5	+24.2	+24.9	+25.6	+26.3	+26.9	273
88	+20.6	+21.3	+22.0	+22.7	+23.4	+24.1	+24.8	+25.5	+26.2	+26.9	+27.5	272
89	+21.2	+21.9	+22.6	+23.3	+24.0	+24.7	+25.4	+26.1	+26.7	+27.4	+28.0	271
90	+21.9	+22.6	+23.3	+24.0	+24.7	+25.4	+26.0	+26.7	+27.3	+28.0	+28.6	270
a h	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	h a

$^{h}_{a}$	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	$^{h}_{a}$
°	°	°	°	°	°	°	°	°	°	°	°	°
45	33.1	32.7	32.2	31.7	31.2	30.7	30.2	29.7	29.2	28.7	28.2	315
46	33.8	33.3	32.8	32.3	31.8	31.3	30.8	30.3	29.8	29.3	28.8	314
47	34.5	34.0	33.5	33.0	32.4	31.9	31.4	30.9	30.4	29.9	29.4	313
48	35.1	34.6	34.1	33.6	33.0	32.5	32.0	31.5	31.0	30.5	29.9	312
49	35.8	35.3	34.8	34.3	33.7	33.2	32.6	32.1	31.6	31.1	30.5	311
50	36.4	35.9	35.4	34.9	34.3	33.8	33.2	32.7	32.2	31.7	31.1	310
51	37.1	36.6	36.1	35.6	35.0	34.5	33.9	33.4	32.8	32.3	31.7	309
52	37.7	37.2	36.7	36.2	35.6	35.1	34.5	33.9	33.3	32.8	32.2	308
53	38.4	37.9	37.3	36.8	36.2	35.7	35.1	34.5	33.9	33.4	32.8	307
54	39.0	38.5	37.9	37.4	36.8	36.3	35.7	35.1	34.5	33.9	33.3	306
55	39.7	39.2	38.6	38.0	37.4	36.9	36.3	35.7	35.1	34.6	33.8	305
56	40.3	39.8	39.2	38.6	38.0	37.4	36.8	36.2	35.6	35.0	34.4	304
57	41.0	40.4	39.8	39.2	38.6	38.0	37.4	36.8	36.2	35.6	35.0	303
58	41.6	41.0	40.4	39.8	39.2	38.6	38.0	37.4	36.8	36.2	35.5	302
59	42.3	41.7	41.1	40.5	39.8	39.2	38.6	38.0	37.4	36.8	36.1	301
60	42.9	42.3	41.7	41.1	40.4	39.8	39.2	38.6	37.9	37.3	36.6	300
61	43.6	43.0	42.3	41.7	41.0	40.4	39.8	39.2	38.5	37.9	37.2	299
62	44.2	43.6	42.9	42.3	41.6	41.0	40.3	39.7	39.0	38.4	37.7	298
63	44.8	44.2	43.5	42.9	42.2	41.6	40.9	40.3	39.6	38.9	38.2	297
64	45.4	44.8	44.1	43.5	42.8	42.2	41.5	40.8	40.1	39.4	38.7	296
65	46.1	45.4	44.7	44.1	43.4	42.8	42.1	41.4	40.7	40.0	39.3	295
66	46.7	46.0	45.3	44.7	44.0	43.3	42.6	41.9	41.2	40.5	39.8	294
67	47.3	46.6	45.9	45.3	44.6	43.9	43.2	42.5	41.8	41.1	40.3	293
68	47.9	47.2	46.5	45.8	45.1	44.4	43.7	43.0	42.3	41.6	40.8	292
69	48.5	47.8	47.1	46.4	45.7	45.0	44.3	43.6	42.9	42.2	41.4	291
70	49.1	48.4	47.7	47.0	46.3	45.6	44.8	44.1	43.4	42.7	41.9	290
71	49.7	49.0	48.3	47.6	46.9	46.2	45.4	44.7	43.9	43.2	42.4	289
72	50.3	49.6	48.9	48.2	47.4	46.7	45.9	45.2	44.4	43.7	42.9	288
73	50.9	50.2	49.5	48.8	48.0	47.3	46.5	45.8	45.0	44.2	43.4	287
74	51.5	50.8	50.0	49.3	48.5	47.8	47.0	46.3	45.5	44.7	43.9	286
75	52.1	51.4	50.6	49.9	49.1	48.4	47.6	46.8	46.0	45.2	44.4	285
76	52.7	52.0	51.2	50.4	49.6	48.9	48.1	47.3	46.5	45.7	44.9	284
77	53.3	52.6	51.8	51.0	50.2	49.4	48.6	47.8	47.0	46.2	45.4	283
78	53.9	53.1	52.3	51.5	50.7	49.9	49.1	48.3	47.5	46.7	45.9	282
79	54 5	53.7	52.9	52.1	51.3	50.5	49.7	48.9	48.0	47.2	46.4	281
80	55.0	54.2	53.4	52.6	51.8	51.0	50.2	49.4	48.5	47.7	46.8	280
81	55.6	54.8	54.0	53.2	52.4	51.6	50.7	49.9	49.0	48.2	47.3	279
82	56.2	55.4	54.6	53.8	52.9	52.1	51.2	50.4	49.5	48.7	47.8	278
83	56.8	56.0	55.2	54.4	53.5	52.7	51.8	50.9	50.0	49.2	48.3	277
84	57.3	56.5	55.7	54.9	54.0	53.2	52.3	51.4	50.5	49.6	48.7	276
85	57.9	57.1	56.3	55.5	54.6	53.7	52.8	51.9	51.0	50.1	49.2	275
86	58.5	57.7	56.8	56.0	55.1	54.2	53.3	52.4	51.5	50.6	49.7	274
87	59.1	58.3	57.4	56.6	55.7	54.8	53.9	53.0	52.0	51.1	50.2	273
88	59.6	58.8	57.9	57.1	56.2	55.3	54 4	53.5	52.5	51.6	50.6	272
89	60.2	59.4	58.5	57.6	56.7	55.8	54.9	54.0	53.0	52.1	51.1	271
90	60.8	59.9	59.0	58.1	57.2	56.3	55.4	54.5	53.5	52.5	51.5	270
$^{a}_{h}$	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	$^{a}_{h}$

a \ h	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
45	+ 6.7	+ 7.6	+ 8.5	+ 9.4	+10.3	+11.2	+12.1	+12.9	+13.8	+14.7	+15.6	315
46	+ 7.1	+ 8.0	+ 8.9	+ 9.8	+10.7	+11.5	+12.4	+13.2	+14.1	+15.0	+15.9	314
47	+ 7.5	+ 8.4	+ 9.3	+10.1	+11.0	+11.9	+12.8	+13.6	+14.4	+15.3	+16.2	313
48	+ 7.9	+ 8.8	+ 9.7	+10.5	+11.4	+12.3	+13.2	+14.0	+14.8	+15.7	+16.6	312
49	+ 8.3	+ 9.2	+10.0	+10.9	+11.7	+12.6	+13.5	+14.3	+15.1	+16.0	+16.9	311
50	+ 8.7	+ 9.6	+10.4	+11.3	+12.1	+13.0	+13.8	+14.7	+15.5	+16.4	+17.2	310
51	+ 9.1	+10.0	+10.8	+11.7	+12.5	+13.4	+14.2	+15.0	+15.8	+16.7	+17.5	309
52	+ 9.5	+10.4	+11.2	+12.1	+12.9	+13.8	+14.6	+15.4	+16.2	+17.1	+17.9	308
53	+ 9.9	+10.8	+11.6	+12.5	+13.3	+14.1	+14.9	+15.7	+16.5	+17.4	+18.2	307
54	+10.3	+11.2	+12.0	+12.9	+13.7	+14.5	+15.3	+16.1	+16.9	+17.8	+18.6	306
55	+10.7	+11.6	+12.4	+13.3	+14.1	+14.9	+15.7	+16.5	+17.3	+18.2	+19.0	305
56	+11.2	+12.1	+12.9	+13.7	+14.5	+15.3	+16.1	+16.9	+17.7	+18.6	+19.4	304
57	+11.6	+12.5	+13.3	+14.1	+14.9	+15.7	+16.5	+17.3	+18.1	+18.9	+19.7	303
58	+12.0	+12.9	+13.7	+14.5	+15.3	+16.1	+16.9	+17.7	+18.5	+19.3	+20.1	302
59	+12.4	+13.3	+14.1	+14.9	+15.7	+16.5	+17.3	+18.1	+18.9	+19.7	+20.5	301
60	+12.9	+13.8	+14.6	+15.4	+16.2	+17.0	+17.8	+18.6	+19.3	+20.1	+20.9	300
61	+13.3	+14.2	+15.0	+15.8	+16.6	+17.4	+18.2	+19.0	+19.7	+20.5	+21.3	299
62	+13.8	+14.6	+15.4	+16.2	+17.0	+17.8	+18.6	+19.4	+20.1	+20.9	+21.7	298
63	+14.3	+15.1	+15.9	+16.7	+17.4	+18.2	+19.0	+19.8	+20.5	+21.3	+22.1	297
64	+14.8	+15.6	+16.4	+17.2	+17.9	+18.7	+19.5	+20.3	+21.0	+21.8	+22.6	296
65	+15.2	+16.0	+16.8	+17.5	+18.3	+19.1	+19.9	+20.7	+21.4	+22.2	+23.0	295
66	+15.7	+16.5	+17.3	+18.1	+18.8	+19.6	+20.4	+21.2	+21.9	+22.7	+23.4	294
67	+16.2	+17.0	+17.7	+18.5	+19.3	+20.1	+20.8	+21.6	+22.3	+23.1	+23.8	293
68	+16.7	+17.5	+18.2	+19.0	+19.8	+20.5	+21.3	+22.1	+22.8	+23.5	+24.3	292
69	+17.2	+18.0	+18.7	+19.5	+20.2	+21.0	+21.7	+22.5	+23.3	+24.0	+24.7	291
70	+17.7	+18.5	+19.2	+20.0	+20.7	+21.5	+22.2	+23.0	+23.7	+24.4	+25.1	290
71	+18.2	+19.0	+19.7	+20.5	+21.2	+22.0	+22.7	+23.4	+24.1	+24.8	+25.5	289
72	+18.8	+19.5	+20.2	+21.0	+21.7	+22.5	+23.2	+23.9	+24.6	+25.3	+26.0	288
73	+19.3	+20.0	+20.7	+21.4	+22.1	+22.9	+23.6	+24.3	+25.0	+25.7	+26.4	287
74	+19.8	+20.5	+21.2	+21.9	+22.6	+23.4	+24.1	+24.8	+25.5	+26.2	+26.9	286
75	+20.3	+21.0	+21.7	+22.4	+23.1	+23.9	+24.6	+25.3	+26.0	+26.7	+27.4	285
76	+20.8	+21.5	+22.2	+22.9	+23.6	+24.4	+25.1	+25.8	+26.5	+27.2	+27.9	284
77	+21.3	+22.0	+22.7	+23.4	+24.1	+24.9	+25.6	+26.3	+27.0	+27.7	+28.3	283
78	+21.9	+22.6	+23.3	+24.0	+24.7	+25.4	+26.1	+26.8	+27.5	+28.2	+28.8	282
79	+22.4	+23.1	+23.8	+24.5	+25.2	+25.9	+26.6	+27.3	+28.0	+28.7	+29.3	281
80	+23.0	+23.7	+24.4	+25.1	+25.8	+26.5	+27.2	+27.9	+28.5	+29.2	+29.8	280
81	+23.5	+24.2	+24.9	+25.6	+26.3	+27.0	+27.7	+28.4	+29.0	+29.7	+30.3	279
82	+24.1	+24.8	+25.5	+26.2	+26.8	+27.5	+28.2	+28.9	+29.5	+30.2	+30.8	278
83	+24.6	+25.3	+26.0	+26.7	+27.3	+28.0	+28.7	+29.4	+30.0	+30.7	+31.3	277
84	+25.2	+25.9	+26.6	+27.3	+27.9	+28.6	+29.2	+29.9	+30.5	+31.2	+31.8	276
85	+25.7	+26.4	+27.1	+27.8	+28.4	+29.1	+29.7	+30.4	+31.0	+31.7	+32.3	275
86	+26.3	+27.0	+27.7	+28.4	+29.0	+29.7	+30.3	+30.9	+31.5	+32.2	+32.8	274
87	+26.9	+27.6	+28.2	+28.9	+29.5	+30.2	+30.8	+31.4	+32.0	+32.7	+33.3	273
88	+27.5	+28.2	+28.8	+29.5	+30.1	+30.8	+31.4	+32.0	+32.6	+33.2	+33.8	272
89	+28.0	+28.7	+29.3	+30.0	+30.6	+31.3	+31.9	+32.5	+33.1	+33.7	+34.3	271
90	+28.6	+29.3	+29.9	+30.6	+31.2	+31.9	+32.5	+33.1	+33.7	+34.3	+34.8	270
a \ h	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	h \ a

a \ h	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
45	28.2	27.7	27.2	26.7	26.2	25.7	25.1	24.5	23.9	23.4	22.8	315
46	28.8	28.3	27.7	27.2	26.7	26.2	25.6	25.0	24.4	23.9	23.3	314
47	29.4	28.9	28.3	27.8	27.2	26.7	26.1	25.5	24.9	24.4	23.8	313
48	29.9	29.4	28.8	28.3	27.7	27.2	26.6	26.0	25.4	24.8	24.2	312
49	30.5	30.0	29.4	28.9	28.3	27.7	27.1	26.5	25.9	25.3	24.7	311
50	31.1	30.5	29.9	29.4	28.8	28.2	27.6	27.0	26.4	25.8	25.1	310
51	31.7	31.1	30.5	29.9	29.3	28.7	28.1	27.5	26.9	26.3	25.6	309
52	32.2	31.6	31.0	30.4	29.8	29.2	28.6	28.0	27.3	26.7	26.0	308
53	32.8	32.2	31.6	31.0	30.4	29.8	29.1	28.5	27.8	27.2	26.5	307
54	33.3	32.7	32.1	31.5	30.9	30.3	29.6	29.0	28.3	27.6	26.9	306
55	33.9	33.3	32.6	32.0	31.4	30.8	30.1	29.5	28.8	28.1	27.4	305
56	34.4	33.8	33.1	32.5	31.9	31.3	30.6	29.9	29.2	28.5	27.8	304
57	35.0	34.4	33.7	33.1	32.4	31.8	31.1	30.4	29.7	29.0	28.3	303
58	35.5	34.9	34.2	33.6	32.9	32.3	31.6	30.9	30.2	29.5	28.7	302
59	36.1	35.4	34.7	34.1	33.4	32.8	32.1	31.4	30.7	30.0	29.2	301
60	36.6	35.9	35.2	34.6	33.9	33.2	32.5	31.8	31.1	30.4	29.6	300
61	37.2	36.5	35.8	35.1	34.4	33.7	33.0	32.3	31.6	30.9	30.1	299
62	37.7	37.0	36.3	35.6	34.9	34.2	33.5	32.8	32.0	31.3	30.5	298
63	38.2	37.5	36.8	36.1	35.4	34.7	34.0	33.3	32.5	31.7	30.9	297
64	38.7	38.0	37.3	36.6	35.9	35.2	34.4	33.7	32.9	32.1	31.3	296
65	39.3	38.6	37.8	37.1	36.4	35.7	34.9	34.1	33.3	32.5	31.7	295
66	39.8	39.1	38.3	37.6	36.8	36.1	35.3	34.5	33.7	32.9	32.1	294
67	40.3	39.6	38.8	38.1	37.3	36.6	35.8	35.0	34.2	33.4	32.5	293
68	40.8	40.1	39.3	38.6	37.8	37.0	36.2	35.4	34.6	33.8	32.9	292
69	41.4	40.6	39.8	39.1	38.3	37.5	36.7	35.9	35.0	34.2	33.3	291
70	41.9	41.1	40.3	39.5	38.7	37.9	37.1	36.3	35.4	34.6	33.7	290
71	42.4	41.6	40.8	40.0	39.2	38.4	37.6	36.8	35.9	35.0	34.1	289
72	42.9	42.1	41.3	40.5	39.7	38.9	38.0	37.2	36.3	35.4	34.5	288
73	43.4	42.6	41.8	41.0	40.2	39.4	38.5	37.6	36.7	35.8	34.9	287
74	43.9	43.1	42.3	41.5	40.6	39.8	38.9	38.0	37.1	36.2	35.3	286
75	44.4	43.6	42.8	42.0	41.1	40.2	39.3	38.4	37.5	36.6	35.7	285
76	44.9	44.1	43.2	42.4	41.5	40.6	39.7	38.8	37.9	37.0	36.1	284
77	45.4	44.6	43.7	42.9	42.0	41.1	40.2	39.3	38.3	37.4	36.5	283
78	45.9	45.1	44.2	43.3	42.4	41.5	40.6	39.7	38.7	37.8	36.8	282
79	46.4	45.6	44.7	43.8	42.9	42.0	41.0	40.1	39.1	38.2	37.2	281
80	46.8	46.0	45.1	44.2	43.3	42.4	41.4	40.5	39.5	38.5	37.5	280
81	47.3	46.5	45.6	44.7	43.7	42.8	41.8	40.9	39.9	38.9	37.9	279
82	47.8	46.9	46.0	45.1	44.1	43.2	42.2	41.2	40.2	39.2	38.2	278
83	48.3	47.4	46.5	45.6	44.6	43.6	42.6	41.6	40.6	39.6	38.6	277
84	48.7	47.8	46.9	46.0	45.0	44.0	43.0	42.0	41.0	40.0	38.9	276
85	49.2	48.3	47.4	46.4	45.4	44.4	43.4	42.4	41.4	40.4	39.3	275
86	49.7	48.8	47.8	46.8	45.8	44.8	43.8	42.8	41.7	40.7	39.6	274
87	50.2	49.2	48.2	47.2	46.2	45.2	44.2	43.2	42.1	41.0	39.9	273
88	50.6	49.6	48.6	47.6	46.6	45.6	44.5	43.5	42.4	41.3	40.2	272
89	51.1	50.1	49.1	48.1	47.0	46.0	44.9	43.9	42.8	41.7	40.6	271
90	51.5	50.5	49.5	48.5	47.4	46.4	45.3	44.2	43.1	42.0	40.9	270
a / h	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	h \ a

a h	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	h a
°	°	°	°	°	°	°	°	°	°	°	°	°
45	-15.6	+16.4	+17.3	+18.2	+19.1	+19.9	+20.8	+21.6	+22.5	+23.3	+24.2	315
46	+15.9	+16.7	+17.6	+18.5	+19.4	+20.2	+21.1	+21.9	+22.8	+23.6	+34.5	314
47	+16.2	+17.0	+17.9	+18.8	+19.7	+20.5	+21.4	+22.2	+23.1	+23.9	+24.7	313
48	+16.6	+17.4	+18.3	+19.1	+20.0	+20.8	+21.7	+22.5	+23.4	+24.2	+25.0	312
49	+16.9	+17.8	+18.6	+19.5	+20.3	+21.2	+22.0	+22.8	+23.6	+24.4	+25.2	311
50	+17.2	+18.1	+18.9	+19.8	+20.6	+21.5	+22.3	+23.1	+23.9	+24.7	+25.5	310
51	+17.5	+18.4	+19.2	+20.1	+20.9	+21.8	+22.6	+23.4	+24.2	+25.0	+25.8	309
52	+17.9	+18.8	+19.6	+20.5	+21.3	+22.1	+22.9	+23.7	+24.5	+25.3	+26.1	308
53	+18.2	+19.1	+19.9	+20.8	+21.6	+22.4	+23.2	+24.0	+24.8	+25.6	+26.4	307
54	+18.6	+19.5	+20.3	+21.1	+21.9	+22.7	+23.5	+24.3	+25.1	+25.9	+26.7	306
55	+19.0	+19.8	+20.6	+21.4	+22.2	+23.0	+23.8	+24.6	+25.4	+26.2	+27.0	305
56	+19.4	+20.2	+21.0	+21.8	+22.6	+23.4	+24.2	+25.0	+25.8	+26.6	+27.3	304
57	+19.7	+20.5	+21.3	+22.1	+22.9	+23.7	+24.5	+25.3	+26.1	+26.9	+27.6	303
58	+20.1	+20.9	+21.7	+22.5	+23.3	+24.1	+24.9	+25.7	+26.4	+27.2	+27.9	302
59	+20.5	+21.3	+22.1	+22.9	+23.7	+24.5	+25.2	+26.0	+26.7	+27.5	+28.2	301
60	+20.9	+21.7	+22.5	+23.3	+24.0	+24.8	+25.6	+26.4	+27.1	+27.9	+28.6	300
61	+21.3	+22.1	+22.9	+23.7	+24.4	+25.2	+25.9	+26.7	+27.4	+28.2	+28.9	299
62	+21.7	+22.5	+23.3	+24.1	+24.8	+25.5	+26.3	+27.1	+27.8	+28.5	+29.3	298
63	+22.1	+22.9	+23.7	+24.5	+25.2	+26.0	+26.7	+27.5	+28.2	+28.9	+29.6	297
64	+22.6	+23.4	+24.1	+24.9	+25.6	+26.4	+27.1	+27.9	+28.6	+29.3	+30.0	296
65	+23.0	+23.8	+24.5	+25.3	+26.0	+26.7	+27.4	+28.2	+28.9	+29.6	+30.3	295
66	+23.4	+24.2	+24.9	+25.7	+26.4	+27.1	+27.8	+28.5	+29.3	+30.0	+30.7	294
67	+23.8	+24.6	+25.3	+26.1	+26.8	+27.5	+28.2	+28.9	+29.6	+30.3	+31.0	293
68	+24.3	+25.0	+25.7	+26.5	+27.2	+27.9	+28.6	+29.3	+30.0	+30.7	+31.4	292
69	+24.7	+25.4	+26.1	+26.9	+27.6	+28.3	+29.0	+29.7	+30.4	+31.1	+31.7	291
70	+25.1	+25.8	+26.5	+27.3	+28.0	+28.7	+29.4	+30.1	+30.8	+31.5	+32.1	290
71	+25.5	+26.2	+26.9	+27.7	+28.4	+29.1	+29.8	+30.5	+31.2	+31.9	+32.5	289
72	+26.0	+26.7	+27.4	+28.1	+28.8	+29.5	+30.2	+30.9	+31.6	+32.3	+32.9	288
73	+26.4	+27.1	+27.8	+28.5	+29.2	+29.9	+30.6	+31.3	+32.0	+32.7	+33.3	287
74	+26.9	+27.6	+28.3	+29.0	+29.7	+30.4	+31.0	+31.7	+32.4	+33.1	+33.7	286
75	+27.4	+28.1	+28.7	+29.4	+30.1	+30.8	+31.4	+32.1	+32.8	+33.4	+34.0	285
76	+27.9	+28.6	+29.2	+29.9	+30.5	+31.2	+31.9	+32.6	+33.2	+33.8	+34.4	284
77	+28.3	+29.0	+29.6	+30.3	+30.9	+31.6	+32.3	+33.0	+33.6	+34.2	+34.8	283
78	+28.8	+29.5	+30.1	+30.8	+31.4	+32.1	+32.7	+33.4	+34.0	+34.6	+35.2	282
79	+29.3	+30.0	+30.6	+31.3	+31.9	+32.5	+33.1	+33.8	+34.4	+35.0	+35.6	281
80	+29.8	+30.5	+31.1	+31.8	+32.4	+33.0	+33.6	+34.2	+34.8	+35.4	+36.0	280
81	+30.3	+30.9	+31.5	+32.2	+32.8	+33.4	+34.0	+34.6	+35.2	+35.8	+36.4	279
82	+30.8	+31.4	+32.0	+32.7	+33.3	+33.9	+34.5	+35.1	+35.7	+36.3	+36.8	278
83	+31.3	+31.9	+32.5	+33.1	+33.7	+34.3	+34.9	+35.5	+36.1	+36.7	+37.2	277
84	+31.8	+32.4	+33.0	+33.6	+34.2	+34.8	+35.4	+36.0	+36.5	+37.1	+37.6	276
85	+32.3	+32.9	+33.5	+34.1	+34.7	+35.3	+35.8	+36.4	+36.9	+37.5	+38.0	275
86	+32.8	+33.4	+34.0	+34.6	+35.2	+35.8	+36.3	+36.9	+37.4	+37.9	+38.4	274
87	+33.3	+33.9	+34.5	+35.1	+35.6	+36.2	+36.7	+37.3	+37.8	+38.3	+38.8	273
88	+33.8	+34.4	+35.0	+35.6	+36.1	+36.7	+37.2	+37.8	+38.3	+38.8	+39.3	272
89	+34.3	+34.9	+35.5	+36.1	+36.6	+37.2	+37.7	+38.2	+38.7	+39.2	+39.7	271
90	+34.8	+35.4	+36.0	+36.6	+37.1	+37.7	+38.2	+38.7	+39.2	+39.7	+40.2	270
a h	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	h a

a \ h	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
45	22.8	22.3	21.7	21.1	20.5	19.9	19.3	18.7	18.0	17.3	16.6	315
46	23.3	22.7	22.1	21.5	20.9	20.3	19.7	19.1	18.4	17.7	17.0	314
47	23.8	23.2	22.6	22.0	21.3	20.7	20.1	19.5	18.8	18.1	17.4	313
48	24.2	23.6	23.0	22.4	21.7	21.1	20.4	19.8	19.1	18.4	17.7	312
49	24.7	24.1	23.4	22.8	22.1	21.5	20.8	20.2	19.5	18.8	18.0	311
50	25.1	24.5	23.8	23.2	22.5	21.9	21.2	20.5	19.8	19.1	18.3	310
51	25.6	25.0	24.3	23.6	22.9	22.3	21.6	20.7	20.2	19.5	18.7	309
52	26.0	25.4	24.7	24.0	23.3	22.6	21.9	21.2	20.5	19.8	19.0	308
53	26.5	25.8	25.1	24.4	23.7	23.0	22.3	21.6	20.9	20.1	19.3	307
54	26.9	26.2	25.5	24.8	24.1	23.4	22.7	22.0	21.2	20.4	19.6	306
55	27.4	26.7	26.0	25.3	24.5	23.8	23.1	22.4	21.6	20.8	20.0	305
56	27.8	27.1	26.4	25.7	24.9	24.2	23.4	22.7	21.9	21.1	20.3	304
57	28.3	27.6	26.8	26.1	25.3	24.6	23.8	23.1	22.3	21.5	20.6	303
58	28.7	28.0	27.2	26.5	25.7	25.0	24.2	23.4	22.6	21.8	20.9	302
59	29.2	28.4	27.7	26.9	26.1	25.4	24.6	23.8	22.9	22.1	21.2	301
60	29.6	28.9	28.1	27.3	26.5	25.7	24.9	24.1	23.2	22.4	21.5	300
61	30.1	29.3	28.5	27.7	26.9	26.1	25.3	24.5	23.6	22.7	21.8	299
62	20.5	29.7	28.9	28.1	27.3	26.5	25.6	24.8	23.9	23.0	22.1	298
63	30.9	30.1	29.3	28.5	27.7	26.9	26.0	25.1	24.2	23.3	22.4	297
64	31.3	30.5	29.7	28.9	28.0	27.2	26.3	25.4	24.5	23.6	22.6	296
65	31.7	30.9	30.1	29.3	28.4	27.5	26.6	25.7	24.8	23.9	22.9	295
66	32.1	31.3	30.4	29.6	28.7	27.8	26.9	26.0	25.1	24.2	23.2	294
67	32.5	31.7	30.8	30.0	29.1	28.2	27.3	26.4	25.4	24.5	23.5	293
68	32.9	32.1	31.2	30.3	29.4	28.5	27.6	26.7	25.7	24.7	23.7	292
69	33.3	32.5	31.6	30.7	29.8	28.9	27.9	27.0	26.0	25.0	24.0	291
70	33.7	32.8	31.9	31.0	30.1	29.2	28.2	27.2	26.2	25.2	24.2	290
71	34.1	33.2	32.3	31.4	30.5	29.5	28.5	27.5	26.5	25.5	24.5	289
72	34.5	33.6	32.7	31.8	30.8	29.8	28.8	27.8	26.8	25.8	24.7	288
73	34.9	34.0	33.1	32.1	31.1	30.1	29.1	28.1	27.1	26.1	25.0	287
74	35.3	34.4	33.4	32.4	31.4	30.4	29.4	28.4	27.3	26.3	25.2	286
75	35.7	34.8	33.8	32.8	31.8	30.8	29.7	28.7	27.6	26.6	25.5	285
76	36.1	35.1	34.1	33.1	32.1	31.1	30.0	29.0	27.9	26.8	25.7	284
77	36.5	35.5	34.5	33.5	32.5	31.4	30.3	29.3	28.2	27.1	26.0	283
78	36.8	35.8	34.8	33.8	32.8	31.7	30.6	29.5	28.4	27.3	26.2	282
79	37.2	36.2	35.2	34.2	33.1	32.0	30.9	29.8	28.7	27.6	26.5	281
80	37.5	36.5	35.5	34.5	33.4	32.3	31.2	30.1	29.0	27.9	26.7	280
81	37.9	36.9	35.8	34.8	33.7	32.6	31.5	30.4	29.3	28.1	26.9	279
82	38.2	37.2	36.1	35.1	34.0	32.9	31.8	30.7	29.5	28.3	27.1	278
83	38.6	37.6	36.5	35.4	34.3	33.2	32.1	30.9	29.7	28.5	27.3	277
84	38.9	37.9	36.8	35.7	34.6	33.5	32.3	31.1	29.9	28.7	27.5	276
85	39.3	38.2	37.1	36.0	34.9	33.8	32.6	31.4	30.2	29.0	27.7	275
86	39.6	38.5	37.4	36.3	35.2	34.0	32.8	31.6	30.4	29.2	27.9	274
87	39.9	38.8	37.7	36.6	35.5	34.3	33.1	31.9	30.6	29.4	28.1	273
88	40.2	39.1	38.0	36.9	35.7	34.5	33.3	32.1	30.8	29.6	28.3	272
89	40.6	39.5	38.3	37.2	36.0	34.8	33.5	32.3	31.0	29.8	28.5	271
90	40.9	39.8	38.6	37.4	36.2	35.0	33.7	32.5	31.2	29.9	28.6	270
a / h	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	h / a

a \ h	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
45	+24.2	+25.1	+25.9	+26.8	+27.6	+28.5	+29.3	+30.2	+31.0	+31.9	+32.7	315
46	+24.5	+25.4	+26.2	+27.0	+27.8	+28.7	+29.5	+30.4	+31.2	+32.0	+32.8	314
47	+24.7	+25.6	+26.4	+27.2	+28.0	+28.9	+29.7	+30.6	+31.4	+32.2	+33.0	313
48	+25.0	+25.9	+26.7	+27.5	+28.3	+29.2	+30.0	+30.8	+31.6	+32.4	+33.2	312
49	+25.2	+26.1	+26.9	+27.7	+28.5	+29.4	+30.2	+31.0	+31.8	+32.6	+33.4	311
50	+25.5	+26.4	+27.2	+28.0	+28.8	+29.6	+30.4	+31.2	+32.0	+32.8	+33.6	310
51	+25.8	+26.6	+27.4	+28.2	+28.9	+29.8	+30.6	+31.4	+32.2	+33.0	+33.8	309
52	+26.1	+26.9	+27.7	+28.5	+29.3	+30.1	+30.9	+31.7	+32.5	+33.3	+34.1	308
53	+26.4	+27.2	+28.0	+28.8	+29.5	+30.3	+31.1	+31.9	+32.7	+33.5	+34.3	307
54	+26.7	+27.5	+28.3	+29.1	+29.8	+30.6	+31.4	+32.2	+33.0	+33.8	+34.5	306
55	+27.0	+27.8	+28.6	+29.4	+30.1	+30.9	+31.7	+32.5	+33.2	+34.0	+34.7	305
56	+27.3	+28.1	+28.9	+29.7	+30.4	+31.2	+32.0	+32.8	+33.5	+34.3	+35.0	304
57	+27.6	+28.4	+29.2	+30.0	+30.7	+31.5	+32.2	+33.0	+33.7	+34.5	+35.2	303
58	+27.9	+28.7	+29.5	+30.3	+31.0	+31.8	+32.5	+33.3	+34.0	+34.7	+35.4	302
59	+28.2	+29.0	+29.8	+30.6	+31.3	+32.1	+32.8	+33.6	+34.2	+34.9	+35.6	301
60	+28.6	+29.4	+30.1	+30.9	+31.6	+32.4	+33.1	+33.8	+34.5	+35.2	+35.9	300
61	+28.9	+29.7	+30.4	+31.2	+31.9	+32.6	+33.3	+34.0	+34.7	+35.4	+36.1	299
62	+29.3	+30.1	+30.8	+31.5	+32.2	+32.9	+33.6	+34.3	+35.0	+35.7	+36.4	298
63	+29.6	+30.4	+31.1	+31.8	+32.5	+33.2	+33.9	+34.6	+35.3	+36.0	+36.6	297
64	+30.0	+30.7	+31.4	+32.1	+32.8	+33.5	+34.2	+34.9	+35.6	+36.3	+36.9	296
65	+30.3	+31.0	+31.7	+32.4	+33.1	+33.8	+34.5	+35.2	+35.8	+36.5	+37.1	295
66	+30.7	+31.4	+32.1	+32.8	+33.4	+34.1	+34.8	+35.5	+36.1	+36.8	+37.4	294
67	+31.0	+31.7	+32.4	+33.1	+33.7	+34.4	+35.1	+35.8	+36.4	+37.1	+37.7	293
68	+31.4	+32.1	+32.8	+33.5	+34.1	+34.8	+35.4	+36.1	+36.7	+37.4	+38.0	292
69	+31.7	+32.4	+33.1	+33.8	+34.4	+35.1	+35.7	+36.4	+37.0	+37.6	+38.2	291
70	+32.1	+32.8	+33.4	+34.1	+34.7	+35.4	+36.0	+36.7	+37.3	+37.9	+38.5	290
71	+32.5	+33.1	+33.7	+34.4	+35.0	+35.7	+36.3	+37.0	+37.6	+38.2	+38.8	289
72	+32.9	+33.5	+34.1	+34.8	+35.4	+36.1	+36.7	+37.3	+37.9	+38.5	+39.1	288
73	+33.3	+33.9	+34.5	+35.1	+35.7	+36.4	+37.0	+37.6	+38.2	+38.8	+39.3	287
74	+33.7	+34.3	+34.9	+35.5	+36.1	+36.7	+37.3	+37.9	+38.5	+39.1	+39.6	286
75	+34.0	+34.6	+35.2	+35.8	+36.4	+37.0	+37.6	+38.2	+38.8	+39.4	+39.9	285
76	+34.4	+35.0	+35.6	+36.2	+36.8	+37.4	+38.0	+38.6	+39.1	+39.7	+40.2	284
77	+34.8	+35.4	+36.0	+36.6	+37.1	+37.7	+38.3	+38.9	+39.4	+40.0	+40.5	283
78	+35.2	+35.8	+36.4	+37.0	+37.5	+38.1	+38.6	+39.2	+39.7	+40.3	+40.8	282
79	+35.6	+36.2	+36.8	+37.4	+37.9	+38.4	+38.9	+39.5	+40.0	+40.5	+41.0	281
80	+36.0	+36.6	+37.2	+37.8	+38.3	+38.8	+39.3	+39.9	+40.4	+40.9	+41.3	280
81	+36.4	+37.0	+37.5	+38.1	+38.6	+39.1	+39.6	+40.2	+40.7	+41.2	+41.6	279
82	+36.8	+37.4	+37.9	+38.5	+39.0	+39.5	+40.0	+40.5	+41.0	+41.5	+41.9	278
83	+37.2	+37.8	+38.3	+38.9	+39.4	+39.9	+40.3	+40.8	+41.3	+41.8	+42.2	277
84	+37.6	+38.2	+38.7	+39.3	+39.8	+40.3	+40.7	+41.2	+41.7	+42.2	+42.6	276
85	+38.0	+38.6	+39.1	+39.6	+40.1	+40.6	+41.0	+41.5	+42.0	+42.5	+42.9	275
86	+38.4	+39.0	+39.5	+40.0	+40.5	+41.0	+41.4	+41.9	+42.3	+42.8	+43.2	274
87	+38.8	+39.4	+39.9	+40.4	+40.9	+41.4	+41.8	+42.2	+42.6	+43.1	+43.5	273
88	+39.3	+39.8	+40.3	+40.8	+41.3	+41.8	+42.2	+42.6	+43.0	+43.4	+43.8	272
89	+39.7	+40.2	+40.7	+41.2	+41.7	+42.2	+42.6	+43.0	+43.4	+43.8	+44.1	271
90	+40.2	+40.7	+41.2	+41.7	+42.1	+42.6	+43.0	+43.4	+43.8	+44.2	+44.5	270
a / h	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	h / a

h / a	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
45	16.6	16.0	15.3	14.6	13.9	13.2	12.5	11.8	11.0	10.2	9.4	315
46	17.0	16.3	15.6	14.9	14.2	13.5	12.7	12.0	11.2	10.4	9.6	314
47	17.4	16.7	15.9	15.2	14.5	13.8	13.0	12.2	11.4	10.6	9.8	313
48	17.7	17.0	16.2	15.5	14.7	14.0	13.2	12.4	11.6	10.8	9.9	312
49	18.0	17.3	16.5	15.8	15.0	14.3	13.5	12.7	11.8	11.0	10.1	311
50	18.3	17.6	16.8	16.1	15.3	14.5	13.7	12.9	12.0	11.1	10.2	310
51	18.7	17.9	17.1	16.4	15.6	14.8	13.9	13.1	12.2	11.3	10.4	309
52	19.0	18.2	17.4	16.6	15.8	15.0	14.1	13.2	12.3	11.4	10.5	308
53	19.3	18.5	17.7	16.9	16.1	15.3	14.4	13.5	12.5	11.6	10.7	307
54	19.6	18.8	18.0	17.2	16.3	15.5	14.6	13.7	12.7	11.8	10.8	306
55	20.0	19.2	18.3	17.5	16.6	17.7	14.8	13.9	12.9	12.0	11.0	305
56	20.3	19.5	18.6	17.7	16.8	15.9	15.0	14.1	13.1	12.2	11.2	304
57	20.6	19.8	18.9	18.0	17.1	16.2	15.3	14.3	13.3	12.4	11.4	303
58	20.9	20.0	19.1	18.2	17.3	16.4	15.5	14.5	13.5	12.5	11.5	302
59	21.2	20.3	19.4	18.5	17.6	16.7	15.7	14.7	13.7	12.7	11.7	301
60	21.5	20.6	19.7	18.8	17.8	16.9	15.9	14.9	13.9	12.9	11.8	300
61	21.8	20.9	20.0	19.1	18.1	17.1	16.1	15.1	14.1	13.1	12.0	299
62	22.1	21.2	20.2	19.3	18.3	17.3	16.3	15.3	14.2	13.2	12.1	298
63	22.4	21.5	20.5	19.5	18.5	17.5	16.5	15.5	14.4	13.4	12.3	297
64	22.6	21.7	20.7	19.7	18.7	17.7	16.7	15.7	14.6	13.5	12.4	296
65	22.9	22.0	21.0	20.0	19.0	18.0	16.9	15.9	14.8	13.7	12.6	295
66	23.2	22.2	21.2	20.2	19.2	18.2	17.1	16.0	14.9	13.8	12.7	294
67	23.5	22.5	21.5	20.5	19.4	18.4	17.3	16.2	15.1	14.0	12.8	293
68	23.7	22.7	21.7	20.7	19.6	18.6	17.5	16.4	15.2	14.1	12.9	292
69	24.0	23.0	21.9	20.9	19.8	18.8	17.7	16.6	15.4	14.2	13.0	291
70	24.2	23.2	22.1	21.1	20.0	19.0	17.9	16.7	15.5	14.3	13.1	290
71	24.5	23.5	22.4	21.3	20.2	19.2	18.1	16.9	15.7	14.5	13.2	289
72	24.7	23.7	22.6	21.5	20.4	19.3	18.2	17.0	15.8	14.6	13.3	288
73	25.0	23.9	22.8	21.7	20.6	19.5	18.4	17.2	15.9	14.7	13.4	287
74	25.2	24.1	23.0	21.9	20.8	19.7	18.5	17.3	16.0	14.8	13.5	286
75	25.5	24.4	23.3	22.2	21.0	19.9	18.7	17.5	16.2	14.9	13.6	285
76	25.7	24.6	23.5	22.4	21.2	20.0	18.8	17.6	16.3	15.0	13.7	284
77	26.0	24.9	23.7	22.6	21.4	20.2	19.0	17.7	16.4	15.1	13.8	283
78	26.2	25.1	23.9	22.7	21.5	20.3	19.1	17.8	16.5	15.2	13.9	282
79	26.5	25.3	24.1	22.9	21.7	20.5	19.3	18.0	16.7	15.4	14.0	281
80	26.7	25.5	24.3	23.1	21.9	20.7	19.4	18.1	16.8	15.5	14.1	280
81	26.9	25.7	24.5	23.3	22.1	20.9	19.6	18.3	16.9	15.6	14.2	279
82	27.1	25.9	24.7	23.5	22.2	21.0	19.7	18.4	17.0	15.7	14.3	278
83	27.3	26.1	24.9	23.7	22.4	21.1	19.8	18.5	17.1	15.8	14.4	277
84	27.5	26.3	25.0	23.8	22.5	21.2	19.9	18.6	17.2	15.9	14.5	276
85	27.7	26.5	25.2	24.0	22.7	21.4	20.0	18.7	17.3	16.0	14.6	275
86	27.9	26.7	25.4	24.1	22.8	21.5	20.1	18.8	17.4	16.0	14.6	274
87	28.1	26.9	25.6	24.3	22.9	21.6	20.2	18.9	17.5	16.1	14.7	273
88	28.3	27.0	25.7	24.4	23.0	21.7	20.3	18.9	17.5	16.1	14.7	272
89	28.5	27.2	25.9	24.6	23.2	21.8	20.4	19.0	17.6	16.2	14.8	271
90	28.6	27.3	26.0	24.7	23.3	21.9	20.5	19.1	17.7	16.3	14.8	270
a / h	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	h / a

a \ h	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
45	+32.7	+33.5	+34.3	+35.2	+36.0	+36.8	+37.6	+38.4	+39.2	+40.0	+40.7	315
46	+32.8	+33.6	+34.4	+35.3	+36.1	+36.9	+37.7	+38.5	+39.3	+40.1	+40.8	314
47	+33.0	+33.8	+34.6	+35.4	+36.2	+37.0	+37.8	+38.6	+39.4	+40.2	+40.9	313
48	+33.2	+34.0	+34.8	+35.6	+36.4	+37.2	+38.0	+38.8	+39.5	+40.3	+41.0	312
49	+33.4	+34.2	+35.0	+35.8	+36.6	+37.4	+38.1	+38.9	+39.6	+40.4	+41.1	311
50	+33.6	+34.4	+35.2	+36.0	+36.8	+37.6	+38.3	+39.1	+39.8	+40.5	+41.2	310
51	+33.8	+34.6	+35.4	+36.2	+36.9	+37.7	+38.4	+39.2	+39.9	+40.6	+41.3	309
52	+34.1	+34.9	+35.6	+36.4	+37.1	+37.9	+38.6	+39.4	+40.1	+40.8	+41.5	308
53	+34.3	+35.1	+35.8	+36.6	+37.3	+38.0	+38.7	+39.5	+40.2	+40.9	+41.6	307
54	+34.5	+35.3	+36.0	+36.8	+37.5	+38.2	+38.9	+39.6	+40.3	+41.0	+41.7	306
55	+34.7	+35.5	+36.2	+37.0	+37.7	+38.4	+39.1	+39.8	+40.4	+41.1	+41.8	305
56	+35.0	+35.7	+36.4	+37.2	+37.9	+38.6	+39.3	+40.0	+40.6	+41.3	+42.0	304
57	+35.2	+35.9	+36.6	+37.3	+38.0	+38.7	+39.4	+40.1	+40.7	+41.4	+42.1	303
58	+35.4	+36.1	+36.8	+37.5	+38.2	+38.9	+39.6	+40.3	+40.9	+41.6	+42.2	302
59	+35.6	+36.3	+37.0	+37.7	+38.4	+39.1	+39.8	+40.5	+41.1	+41.7	+42.3	301
60	+35.9	+36.6	+37.3	+38.0	+38.6	+39.3	+40.0	+40.7	+41.3	+41.9	+42.5	300
61	+36.1	+36.8	+37.5	+38.2	+38.8	+39.5	+40.1	+40.8	+41.4	+42.0	+42.6	299
62	+36.4	+37.1	+37.7	+38.4	+39.0	+39.7	+40.3	+41.0	+41.6	+42.2	+42.8	298
63	+36.6	+37.3	+37.9	+38.6	+39.2	+39.9	+40.5	+41.1	+41.7	+42.3	+42.9	297
64	+36.9	+37.6	+38.2	+38.9	+39.5	+40.1	+40.7	+41.3	+41.9	+42.5	+43.1	296
65	+37.1	+37.8	+38.4	+39.1	+39.7	+40.3	+40.9	+41.5	+42.1	+42.7	+43.2	295
66	+37.4	+38.1	+38.7	+39.3	+39.9	+40.5	+41.1	+41.7	+42.3	+42.9	+43.4	294
67	+37.7	+38.3	+38.9	+39.5	+40.1	+40.7	+41.3	+41.9	+42.4	+43.0	+43.5	293
68	+38.0	+38.6	+39.2	+39.8	+40.4	+41.0	+41.5	+42.1	+42.6	+43.2	+43.7	292
69	+38.2	+38.8	+39.4	+40.0	+40.6	+41.2	+41.7	+42.3	+42.8	+43.3	+43.8	291
70	+38.5	+39.1	+39.7	+40.3	+40.8	+41.4	+41.9	+42.5	+43.0	+43.5	+44.0	290
71	+38.8	+39.4	+39.9	+40.5	+41.0	+41.6	+42.1	+42.6	+43.1	+43.6	+44.1	289
72	+39.1	+39.7	+40.2	+40.8	+41.3	+41.8	+42.3	+42.8	+43.3	+43.8	+44.3	288
73	+39.3	+39.9	+40.4	+41.0	+41.5	+42.0	+42.5	+43.0	+43.5	+44.0	+44.4	287
74	+39.6	+40.2	+40.7	+41.2	+41.7	+42.2	+42.7	+43.2	+43.7	+44.2	+44.6	286
75	+39.9	+40.4	+40.9	+41.4	+41.9	+42.4	+42.9	+43.4	+43.8	+44.3	+44.7	285
76	+40.2	+40.7	+41.2	+41.7	+42.2	+42.7	+43.1	+43.6	+44.0	+44.5	+44.9	284
77	+40.5	+41.0	+41.5	+42.0	+42.4	+42.9	+43.3	+43.8	+44.2	+44.6	+45.0	283
78	+40.8	+41.3	+41.8	+42.3	+42.7	+43.1	+43.5	+44.0	+44.4	+44.8	+45.2	282
79	+41.0	+41.5	+42.0	+42.5	+42.9	+43.3	+43.7	+44.2	+44.6	+45.0	+45.4	281
80	+41.3	+41.8	+42.3	+42.8	+43.2	+43.6	+44.0	+44.4	+44.8	+45.2	+45.6	280
81	+41.6	+42.1	+42.5	+43.0	+43.4	+43.8	+44.2	+44.6	+45.0	+45.4	+45.7	279
82	+41.9	+42.4	+42.8	+43.3	+43.7	+44.1	+44.5	+44.9	+45.2	+45.6	+45.9	278
83	+42.2	+42.7	+43.1	+43.5	+43.9	+44.3	+44.7	+45.1	+45.4	+45.7	+46.0	277
84	+42.6	+43.0	+43.4	+43.8	+44.2	+44.6	+45.0	+45.3	+45.6	+45.9	+46.2	276
85	+42.9	+43.3	+43.7	+44.1	+44.4	+44.8	+45.2	+45.5	+45.8	+46.1	+46.3	275
86	+43.2	+43.6	+44.0	+44.4	+44.7	+45.1	+45.4	+45.7	+46.0	+46.3	+46.5	274
87	+43.5	+43.9	+44.3	+44.6	+44.9	+45.3	+45.6	+45.9	+46.2	+46.5	+46.7	273
88	+43.8	+44.2	+44.6	+44.9	+45.2	+45.6	+45.9	+46.2	+46.4	+46.7	+46.9	272
89	+44.1	+44.5	+44.9	+45.2	+45.5	+45.8	+46.1	+46.4	+46.6	+46.8	+47.0	271
90	+44.5	+44.9	+45.2	+45.5	+45.8	+46.1	+46.3	+46.6	+46.8	+47.0	+47.2	270
a \ h	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	h \ a

h / a	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
45	9.4	8.6	7.7	6.8	5.9	5.0	4.0	3.1	2.1	1.1	0.0	315
46	9.6	8.7	7.8	6.9	6.0	5.1	4.1	3.1	2.1	1.1	0.0	314
47	9.8	8.9	8.0	7.1	6.1	5.2	4.2	3.2	2.2	1.1	0.0	313
48	9.9	9.0	8.1	7.2	6.2	5.2	4.2	3.2	2.2	1.1	0.0	312
49	10.1	9.2	8.2	7.3	6.3	5.3	4.3	3.3	2.3	1.2	0.0	311
50	10.2	9.3	8.3	7.4	6.4	5.4	4.4	3.4	2.3	1.2	0.0	310
51	10.4	9.5	8.5	7.5	6.5	5.5	4.5	3.4	2.3	1.2	0.0	309
52	10.5	9.6	8.6	7.6	6.6	5.6	4.5	3.4	2.3	1.2	0.0	308
53	10.7	9.8	8.8	7.8	6.7	5.7	4.6	3.5	2.4	1.2	0.0	307
54	10.8	9.9	8.9	7.9	6.8	5.7	4.6	3.5	2.4	1.2	0.0	306
55	11.0	10.0	9.0	8.0	6.9	5.8	4.7	3.6	2.4	1.2	0.0	305
56	11.2	10.2	9.1	8.1	7.0	5.9	4.7	3.6	2.4	1.2	0.0	304
57	11.4	10.4	9.3	8.2	7.1	6.0	4.8	3.7	2.5	1.3	0.0	303
58	11.5	10.5	9.4	8.3	7.2	6.1	4.9	3.7	2.5	1.3	0.0	302
59	11.7	10.6	9.5	8.4	7.3	6.2	5.0	3.8	2.5	1.3	0 0	301
60	11.8	10.7	9.6	8.5	7.4	6.2	5.0	3.8	2.5	1.3	0.0	300
61	12.0	10.9	9.8	8.7	7.5	6.3	5.1	3.9	2.6	1.3	0.0	299
62	12.1	11.0	9.9	8.8	7.6	6.4	5.1	3.9	2.6	1.3	0.0	298
63	12.3	11.2	10.0	8.9	7.7	6.5	5.2	4.0	2.7	1.4	0.0	297
64	12.4	11.3	10.1	8.9	7.7	6.5	5.2	4.0	2.7	1.4	0.0	296
65	12.6	11.4	10.2	9.0	7.8	6.6	5.3	4.0	2.7	1.4	0.0	295
66	12.7	11.5	10.3	9.1	7.9	6.6	5.3	4.0	2.7	1.4	0 0	294
67	12.8	11.6	10.4	9.2	8 0	6.7	5.4	4.1	2.8	1.4	0.0	293
68	12.9	11.7	10.5	9.3	8.0	6.7	5 4	4.1	2.8	1.4	0.0	292
69	13.0	11.8	10.6	9.4	8.1	6.8	5.5	4.2	2.8	1.4	0.0	291
70	13.1	11.9	10.6	9.4	8.1	6.8	5.5	4.2	2.8	1.4	0.0	290
71	13.2	12.0	10.7	9.5	8.2	6.9	5.5	4.2	2.8	1.4	0.0	289
72	13.3	12.1	10.8	9.5	8.2	6.9	5.5	4.2	2.8	1.4	0.0	288
73	13.4	12.2	10.9	9.6	8 3	7.0	5.6	4.2	2.8	1.4	0.0	287
74	13.5	12.3	11.0	9.7	8.4	7.0	5.6	4.2	2.8	1.4	0.0	286
75	13.6	12.4	11.1	9.8	8.5	7.1	5.7	4.3	2.9	1.5	0.0	285
76	13.7	12.4	11.1	9.8	8.5	7.1	5.7	4.3	2.9	1.5	0.0	284
77	13.8	12.5	11.2	9.9	8.6	7.2	5.8	4.4	2.9	1.5	0.0	283
78	13.9	12.6	11.3	10.0	8.6	7.2	5.8	4.4	2.9	1.5	0.0	282
79	14.0	12.7	11.4	10.1	8.7	7.3	5.8	4.4	2.9	1.5	0.0	281
80	14.1	12.8	11.4	10.1	8.7	7.3	5.8	4.4	2.9	1.5	0 0	280
81	14.2	12.9	11.5	10.2	8.8	7.4	5.9	4.5	3.0	1.5	0.0	279
82	14.3	13.0	11.6	10.2	8.8	7.4	5.9	4.5	2.0	1.5	0.0	278
83	14.4	13.1	11.7	10.3	8.8	7.4	5.9	4.5	3.0	1.5	0 0	277
84	14.5	13.1	11.7	10.3	8.8	7.4	5.9	4.5	3.0	1.5	0.0	276
85	14.6	13.2	11.8	10.4	8.9	7.5	6.0	4.5	3.0	1.5	0.0	275
86	14 6	13.2	11.8	10.4	8.9	7.5	6.0	4.5	3.0	1.5	0.0	274
87	14.7	13.3	11.8	10.4	8.9	7.5	6.0	4.5	3.0	1.5	0 0	273
88	14.7	13.3	11.8	10.4	8.9	7.5	6.0	4.5	3.0	1.5	0.0	272
89	14.8	13.4	11.9	10.5	9.0	7.5	6.0	4.5	3.0	1.5	0.0	271
90	14 8	13 4	11.9	10 5	9.0	7.5	6.0	4.5	3.0	1.5	0 0	270
a / h	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	h / a

a \ h	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
45	+40.7	+41.5	+42.2	+43.0	+43.8	+44.6	+45.3	+46.1	+46.8	+47.5	+48.2	315
46	+40.8	+41.6	+42.3	+43.1	+43.9	+44.6	+45.3	+46.1	+46.8	+47.5	+48.2	314
47	+40.9	+41.7	+42.4	+43.2	+43.9	+44.6	+45.3	+46.1	+46.8	+47.5	+48.2	313
48	+41.0	+41.8	+42.5	+43.3	+44.0	+44.7	+45.4	+46.2	+46.9	+47.6	+48.2	312
49	+41.1	+41.9	+42.6	+43.3	+44.0	+44.7	+45.4	+46.2	+46.9	+47.6	+48.2	311
50	+41.2	+42.0	+22.7	+43.4	+44.1	+44.8	+45.5	+46.2	+46.9	+47.6	+48.2	310
51	+41.3	+42.1	+42.8	+43.5	+44.2	+44.9	+45.5	+46.2	+46.9	+47.6	+48.2	309
52	+41.5	+42.2	+42.9	+43.6	+44.3	+45.0	+45.6	+46.3	+47.0	+47.6	+48.2	308
53	+41.6	+42.3	+43.0	+43.7	+44.3	+45.0	+45.6	+46.3	+47.0	+47.6	+48.2	307
54	+41.7	+42.4	+43.1	+43.8	+44.4	+45.1	+45.7	+46.4	+47.0	+47.6	+48.2	306
55	+41.8	+42.5	+43.2	+43.9	+44.5	+45.1	+45.7	+46.4	+47.0	+47.6	+48.2	305
56	+42.0	+42.7	+43.3	+44.0	+44.6	+45.2	+45.8	+46.5	+47.1	+47.7	+48.2	304
57	+42.1	+42.8	+43.4	+44.1	+44.7	+45.3	+45.8	+46.5	+47.1	+47.7	+48.2	303
58	+42.2	+42.9	+43.5	+44.2	+44.8	+45.4	+45.9	+46.5	+47.1	+47.7	+48.2	302
59	+42.3	+43.0	+43.6	+44.3	+44.9	+45.5	+46.0	+46.6	+47.1	+47.7	+48.2	301
60	+42.5	+43.2	+43.8	+44.4	+45.0	+45.6	+46.1	+46.7	+47.2	+47.7	+48.2	300
61	+42.6	+43.3	+43.9	+44.5	+45.0	+45.6	+46.1	+46.7	+47.2	+47.7	+48.2	299
62	+42.8	+43.4	+44.0	+44.6	+45.1	+45.7	+46.2	+46.7	+47.2	+47.7	+48.2	298
63	+42.9	+43.5	+44.1	+44.7	+45.2	+45.7	+46.2	+46.7	+47.2	+47.7	+48.2	297
64	+43.1	+43.7	+44.2	+44.8	+45.3	+45.8	+46.3	+46.8	+47.3	+47.8	+48.2	296
65	+43.2	+43.8	+44.3	+44.9	+45.4	+45.9	+46.3	+46.8	+47.3	+47.8	+48.2	295
66	+43.4	+44.0	+44.5	+45.0	+45.5	+46.0	+46.4	+46.9	+47.3	+47.8	+48.2	294
67	+43.5	+44.1	+44.6	+45.1	+45.6	+46.1	+46.5	+46.9	+47.3	+47.8	+48.2	293
68	+43.7	+44.2	+44.7	+45.2	+45.7	+46.2	+46.6	+47.0	+47.4	+47.8	+48.2	293
69	+43.8	+44.3	+44.8	+45.3	+45.8	+46.2	+46.6	+47.0	+47.4	+47.8	+48.2	291
70	+44.0	+44.5	+45.0	+45.5	+45.9	+46.3	+46.7	+47.1	+47.5	+47.9	+48.2	290
71	+44.1	+44.6	+45.1	+45.6	+46.0	+46.4	+46.7	+47.1	+47.5	+47.9	+48.2	289
72	+44.3	+44.8	+45.2	+45.7	+46.1	+46.5	+46.8	+47.2	+47.6	+47.9	+48.2	288
73	+44.4	+44.9	+45.3	+45.7	+46.1	+46.5	+46.8	+47.2	+47.6	+47.9	+48.2	287
74	+44.6	+45.0	+45.4	+45.8	+46.2	+46.6	+46.9	+47.3	+47.6	+47.9	+48.2	286
75	+44.7	+45.1	+45.5	+45.9	+46.3	+46.6	+46.9	+47.3	+47.6	+47.9	+48.2	285
76	+44.9	+45.3	+45.7	+46.1	+46.4	+46.7	+47.0	+47.4	+47.7	+48.0	+48.2	284
77	+45.0	+45.4	+45.8	+46.2	+46.5	+46.8	+47.0	+47.4	+47.7	+48.0	+48.2	283
78	+45.2	+45.6	+45.9	+46.3	+46.6	+46.9	+47.1	+47.4	+47.7	+48.0	+48.2	282
79	+45.4	+45.7	+46.0	+46.4	+46.7	+47.0	+47.2	+47.5	+47.7	+48.0	+48.2	281
80	+45.6	+45.9	+46.2	+46.5	+46.8	+47.1	+47.3	+47.6	+47.8	+48.0	+48.2	280
81	+45.7	+46.0	+46.3	+46.6	+46.9	+47.2	+47.4	+47.6	+47.8	+48.0	+48.2	279
82	+45.9	+46.2	+46.5	+46.8	+47.0	+47.3	+47.5	+47.7	+47.9	+48.1	+48.2	278
83	+46.0	+46.3	+46.6	+46.9	+47.1	+47.3	+47.5	+47.7	+47.9	+48.1	+48.2	277
84	+46.2	+46.5	+46.7	+47.0	+47.2	+47.4	+47.6	+47.8	+48.0	+48.1	+48.2	276
85	+46.3	+46.6	+46.8	+47.1	+47.3	+47.5	+47.6	+47.8	+48.0	+48.1	+48.2	275
86	+46.5	+46.8	+47.0	+47.2	+47.4	+47.6	+47.7	+47.9	+48.0	+48.1	+48.2	274
87	+46.7	+46.9	+47.1	+47.3	+47.5	+47.7	+47.8	+47.9	+48.0	+48.1	+48.2	273
88	+46.9	+47.1	+47.2	+47.4	+47.6	+47.8	+47.9	+48.0	+48.1	+48.2	+48.2	272
89	+47.0	+47.2	+47.3	+47.5	+47.7	+47.8	+47.9	+48.0	+48.1	+48.2	+48.2	271
90	+47.2	+47.4	+47.5	+47.7	+47.8	+47.9	+48.0	+48.1	+48.2	+48.2	+48.2	270
a \ h	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	h \ a

a \ h	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
90	90.0	89.3	88.6	88.0	87.3	86.7	86.0	85.3	84.6	84.0	83.3	270
91	90.7	90.1	89.4	88.7	88.0	87.4	86.7	86.0	85.3	84.7	84.0	269
92	91.5	90.9	90.2	89.5	98.8	88.2	87.5	86.8	86.1	85.5	84.8	268
93	92.2	91.6	90.9	90.2	99.5	88.9	88.2	87.5	86.8	86.2	85.5	267
94	93.0	92.4	91.7	91.0	90.3	89.7	89.0	88.3	87.6	86.9	86.2	266
95	93.7	93.1	92.4	91.7	91.0	90.4	89.7	89.0	88.3	87.6	86.9	265
96	94.5	93.9	93.2	92.5	91.8	91.2	90.5	89.8	89.1	88.4	87.7	264
97	95.2	94.6	93.9	93.2	92.5	91.9	91.2	90.5	89.8	89.1	88.4	263
98	96.0	95.4	94.7	94.0	93.3	92.7	92.0	91.3	90.6	89.9	89.2	262
99	96.7	96.1	95.4	94.7	94.0	93.4	92.7	92.0	91.3	90.6	89.9	261
100	97.5	96.9	96.2	95.5	94.8	94.2	93.5	92.8	92.1	91.4	90.7	260
101	98.2	97.6	96.9	96.2	95.5	94.9	94.2	93.5	92.8	92.1	91.4	259
102	99.0	98.4	97.7	97.0	96.3	95.7	95.0	94.3	93.6	92.9	92.2	258
103	99.7	99.1	98.4	97.8	97.1	96.4	95.7	95.0	94.3	93.6	92.9	257
104	100.5	99.9	99.2	98.6	97.9	97.2	96.5	95.8	95.1	94.4	93.7	256
105	101.2	100.6	99.9	99.3	98.6	97.9	97.2	96.5	95.8	95.1	94.4	255
106	102.0	101.4	100.7	100.1	99.4	98.7	98.0	97.3	96.6	95.9	95.2	254
107	102.8	102.2	101.5	100.9	100.2	99.5	98.8	98.1	97.4	96.7	96.0	253
108	103.6	103.0	102.3	101.7	101.0	100.3	99.6	98.9	98.2	97.5	96.8	252
109	104.4	103.8	103.1	102.4	101.7	101.0	100.3	99.6	98.9	98.2	97.5	251
110	105.2	104.6	103.9	103.2	102.5	101.8	101.1	100.4	99.7	99.0	98.3	250
111	106.0	105.4	104.7	104.0	103.3	102.6	101.9	101.2	100.5	99.8	99.1	249
112	106.8	106.2	105.5	104.8	104.1	103.4	102.7	102.0	101.3	100.6	99.9	248
113	107.6	107.0	106.3	105.6	104.9	104.2	103.5	102.8	102.1	101.4	100.7	247
114	108.4	107.8	107.1	106.4	105.7	105.0	104.3	103.6	102.9	102.2	101.5	246
115	109.2	108.6	107.9	107.2	106.5	105.8	105.1	104.4	103.7	103.0	102.3	245
116	110.0	109.4	108.7	108.0	107.3	106.7	106.0	105.3	104.6	103.8	103.1	244
117	110.8	110.2	109.5	108.8	108.1	107.5	106.8	106.1	105.4	104.6	103.9	243
118	111.6	111.0	110.3	109.6	108.9	108.3	107.6	106.9	106.2	105.5	104.7	242
119	112.4	111.8	111.1	110.4	109.7	109.1	108.4	107.7	107.0	106.3	105.5	241
120	113.3	112.7	112.0	111.3	110.6	100.0	109.3	108.6	107.9	107.2	106.4	240
121	114.1	113.5	112.8	112.1	111.4	110.8	110.1	109.4	108.7	108.0	107.2	239
122	115.0	114.4	113.7	113.0	112.3	111.7	111.0	110.3	109.6	108.9	108.1	238
123	115.8	115.2	114.5	113.9	113.2	112.5	111.8	111.1	110.4	109.7	109.0	237
124	116.7	116.1	115.4	114.8	114.1	113.4	112.7	112.0	111.3	110.6	109.9	236
125	117.5	116.9	116.2	115.6	114.9	114.3	113.6	112.9	112.2	111.5	110.8	235
126	118.4	117.8	117.1	116.5	115.8	115.2	114.5	113.8	113.1	112.4	111.7	234
127	119.3	118.7	118.0	117.4	116.7	116.1	115.4	114.7	114.0	113.3	112.6	233
128	120.2	119.6	118.9	118.3	117.6	117.0	116.3	115.6	114.9	114.2	113.5	232
129	121.1	120.5	119.8	119.2	118.5	117.9	117.2	116.5	115.8	115.1	114.4	231
130	122.0	121.4	120.7	120.1	119.4	118.8	118.1	117.4	116.7	116.0	115.3	230
131	122.9	122.3	121.6	121.0	120.3	119.7	119.0	118.3	117.6	116.9	116.2	229
132	123.9	123.3	122.6	122.0	123.3	120.7	120.0	119.3	118.6	117.9	117.2	228
133	124.8	124.2	123.5	122.9	122.2	121.6	120.9	120.2	119.5	118.8	118.1	227
134	125.8	125.2	124.5	123.9	123.2	122.6	121.9	121.2	120.5	119.8	119.1	226
135	126.7	126.1	125.5	124.9	124.2	123.6	122.9	122.2	121.5	120.8	120.1	225
a \ h	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	h \ a

h / a	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
90	0.0	+ 0.8	+ 1.5	+ 2.3	+ 3.0	+ 3.8	+ 4.5	+ 5.2	+ 5.9	+ 6.7	+ 7.4	270
91	+ 0.7	+ 1.5	+ 2.2	+ 3.0	+ 3.7	+ 4.5	+ 5.2	+ 5.9	+ 6.6	+ 7.4	+ 8.1	269
92	+ 1.3	+ 2.1	+ 2.8	+ 3.6	+ 4.3	+ 5.1	+ 5.8	+ 6.6	+ 7.3	+ 8.1	+ 8.8	268
93	+ 2.0	+ 2.8	+ 3.5	+ 4.3	+ 5.0	+ 5.8	+ 6.5	+ 7.3	+ 8.0	+ 8.8	+ 9.5	267
94	+ 2.7	+ 3.5	+ 4.2	+ 5.0	+ 5.7	+ 6.5	+ 7.2	+ 8.0	+ 8.7	+ 9.5	+10.2	266
95	+ 3.4	+ 4.2	+ 4.9	+ 5.7	+ 6.4	+ 7.2	+ 7.9	+ 8.7	+ 9.4	+10.2	+10.9	265
96	+ 4.0	+ 4.8	+ 5.5	+ 6.3	+ 7.0	+ 7.8	+ 8.5	+ 9.3	+10.0	+10.8	+11.5	264
97	+ 4.7	+ 5.5	+ 6.2	+ 7.0	+ 7.7	+ 8.5	+ 9.2	+10.0	+10.7	+11.5	+12.2	263
98	+ 5.3	+ 6.1	+ 6.8	+ 7.6	+ 8.3	+ 9.1	+ 9.8	+10.6	+11.3	+12.1	+12.8	262
99	+ 6.0	+ 6.8	+ 7.5	+ 8.3	+ 9.0	+ 9.8	+10.5	+11.3	+12.0	+12.8	+13.5	261
100	+ 6.6	+ 7.4	+ 8.1	+ 8.9	+ 9.6	+10.4	+11.1	+11.9	+12.6	+13.4	+14.1	260
101	+ 7.3	+ 8.1	+ 8.8	+ 9.6	+10.3	+11.1	+11.8	+12.6	+13.3	+14.1	+14.8	259
102	+ 7.9	+ 8.7	+ 9.5	+10.3	+11.0	+11.8	+12.5	+13.3	+14.0	+14.8	+15.5	258
103	+ 8.6	+ 9.4	+10.2	+11.0	+11.7	+12.5	+13.2	+14.0	+14.7	+15.5	+16.2	257
104	+ 9.2	+10.0	+10.8	+11.6	+12.3	+13.1	+13.8	+14.6	+15.3	+16.1	+16.8	256
105	+ 9.9	+10.7	+11.5	+12.3	+13.0	+13.8	+14.5	+15.3	+16.0	+16.8	+17.5	255
106	+10.6	+11.4	+12.1	+12.9	+13.6	+14.4	+15.1	+15.9	+16.6	+17.4	+18.1	254
107	+11.3	+12.1	+12.8	+13.6	+14.3	+15.1	+15.8	+16.6	+17.3	+18.1	+18.8	253
108	+11.9	+12.7	+13.4	+14.2	+14.9	+15.7	+16.4	+17.2	+17.9	+18.7	+19.4	252
109	+12.6	+13.4	+14.1	+14.9	+15.6	+16.4	+17.1	+17.9	+18.6	+19.4	+20.1	251
110	+13.2	+14.0	+14.7	+15.5	+16.2	+17.0	+17.7	+18.5	+19.2	+20.0	+20.7	250
111	+13.9	+14.7	+15.4	+16.2	+16.9	+17.7	+18.4	+19.2	+19.9	+20.7	+21.4	249
112	+14.5	+15.3	+16.0	+16.8	+17.5	+18.3	+19.0	+19.8	+20.5	+21.3	+22.0	248
113	+15.2	+16.0	+16.7	+17.5	+18.2	+19.0	+19.7	+20.5	+21.2	+22.0	+22.7	247
114	+15.8	+16.6	+17.3	+18.1	+18.8	+19.6	+20.3	+21.1	+21.8	+22.6	+23.3	246
115	+16.4	+17.2	+18.0	+18.8	+19.5	+20.3	+21.0	+21.8	+22.5	+23.3	+24.0	245
116	+17.0	+17.8	+18.6	+19.4	+20.1	+20.9	+21.6	+22.4	+23.1	+23.9	+24.6	244
117	+17.7	+18.5	+19.3	+20.1	+20.8	+21.6	+22.3	+23.1	+23.8	+24.5	+25.3	243
118	+18.3	+19.1	+19.9	+20.7	+21.4	+22.2	+22.9	+23.7	+24.4	+25.2	+25.9	242
119	+18.9	+19.7	+20.5	+21.3	+22.0	+22.8	+23.6	+24.4	+25.1	+25.9	+26.6	241
120	+19.5	+20.3	+21.1	+21.9	+22.6	+23.4	+24.2	+25.0	+25.7	+26.5	+27.2	240
121	+20.1	+20.9	+21.7	+22.5	+23.3	+24.1	+24.9	+25.7	+26.4	+27.2	+27.9	239
122	+20.7	+21.5	+22.3	+23.1	+23.9	+24.7	+25.5	+26.3	+27.0	+27.8	+28.5	238
123	+21.3	+22.1	+22.9	+23.7	+24.5	+25.3	+26.1	+26.9	+27.6	+28.4	+29.2	237
124	+21.9	+22.7	+23.5	+24.3	+25.1	+25.9	+26.7	+27.5	+28.2	+29.0	+29.8	236
125	+22.5	+23.3	+24.1	+24.9	+25.7	+26.5	+27.3	+28.1	+28.9	+29.7	+30.5	235
126	+23.1	+23.9	+24.7	+25.5	+26.3	+27.1	+27.9	+28.7	+29.5	+30.3	+31.1	234
127	+23.7	+24.5	+25.3	+26.1	+26.9	+27.7	+28.5	+29.3	+30.1	+31.0	+31.8	233
128	+24.2	+25.1	+25.9	+26.7	+27.5	+28.3	+29.1	+29.9	+30.7	+31.5	+32.3	232
129	+24.8	+25.7	+26.5	+27.3	+28.1	+28.9	+29.7	+30.5	+31.3	+32.1	+32.9	231
130	+25.4	+26.3	+27.1	+27.9	+28.7	+29.5	+30.3	+31.1	+31.9	+32.7	+33.5	230
131	+26.0	+25.9	+27.7	+28.5	+29.3	+30.1	+30.9	+31.7	+32.5	+33.3	+34.1	229
132	+26.5	+27.4	+28.2	+29.0	+29.8	+30.6	+31.4	+32.2	+33.0	+33.8	+34.6	228
133	+27.1	+28.0	+28.8	+29.6	+30.4	+31.2	+32.0	+32.8	+33.6	+34.4	+35.2	227
134	+27.6	+28.5	+29.3	+30.1	+30.9	+31.8	+32.6	+33.4	+34.2	+35.0	+35.8	226
135	+28.1	+29.0	+29.8	+30.7	+31.5	+32.4	+33.2	+34.0	+34.8	+35.6	+36.4	225
a / h	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	h / a

a \ h	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	29°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
90	83.3	82.6	81.9	81.3	80.6	79.9	79.2	78.5	77.8	77.1	76.4	270
91	84.0	83.3	82.6	82.0	81.3	80.6	79.9	79.2	78.5	77.8	77.1	269
92	84.8	84.1	83.4	82.7	82.0	81.3	80.6	79.9	79.2	78.5	77.8	268
93	85.5	84.8	84.1	83.4	82.7	82.0	81.3	80.6	79.9	79.2	78.5	267
94	86.2	85.5	84.8	84.1	83.4	82.7	82.0	81.3	80.6	79.9	79.2	266
95	86.9	86.2	85.5	84.8	84.1	83.4	82.7	82.0	81.3	80.6	79.9	265
96	87.7	87.0	86.3	85.6	84.9	84.2	83.5	82.8	82.1	81.4	80.6	264
97	88.4	87.7	87.0	86.3	85.6	84.9	84.2	83.5	82.8	82.1	81.3	263
98	89.2	88.5	87.8	87.1	86.4	85.7	84.9	84.2	83.5	82.8	82.0	262
99	89.9	89.2	88.5	87.8	87.1	86.4	85.6	84.9	84.2	83.5	82.7	261
100	90.7	90.0	89.3	88.6	87.9	87.2	86.4	85.7	84.9	84.2	83.4	260
101	91.4	90.7	90.0	89.3	88.6	87.9	87.1	86.4	85.6	84.9	84.1	259
102	92.2	91.5	90.8	90.1	89.4	88.7	87.9	87.2	86.4	85.6	84.8	258
103	92.9	92.2	91.5	90.8	90.1	89.4	88.6	87.9	87.1	86.3	85.5	257
104	93.7	93.0	92.3	91.6	90.9	90.2	89.4	88.7	87.9	87.1	86.3	256
105	94.4	93.7	93.0	92.3	91.6	90.9	90.1	89.4	88.6	87.8	87.0	255
106	95.2	94.5	93.8	93.1	92.4	91.7	90.9	90.2	89.4	88.6	87.8	254
107	96.0	95.3	94.5	93.8	93.1	92.4	91.6	90.9	90.1	89.3	88.5	253
108	96.8	96.1	95.3	94.6	93.9	93.2	92.4	91.7	90.9	90.1	89.3	252
109	97.5	96.8	96.0	95.3	94.6	93.9	93.1	92.4	91.6	90.8	90.0	251
110	98.3	97.6	96.8	96.1	95.4	94.7	93.9	93.2	92.4	91.6	90.8	250
111	99.1	98.4	97.6	96.9	96.1	95.4	94.6	93.9	93.1	92.3	91.5	249
112	99.9	99.2	98.4	97.7	96.9	96.2	95.4	94.7	93.9	93.1	92.3	248
113	100.7	100.0	99.2	98.5	97.7	97.0	96.2	95.4	94.6	93.8	93.0	247
114	101.5	101.6	100.0	99.3	98.5	97.8	97.0	96.2	95.4	94.6	93.8	246
115	102.3	102.6	100.8	100.1	99.3	98.6	97.8	97.0	96.2	95.4	94.6	245
116	103.1	102.4	101.7	101.0	100.2	99.4	98.6	97.8	97.0	96.2	95.4	244
117	103.9	103.2	102.5	101.8	101.0	100.2	99.4	98.6	97.8	97.0	96.2	243
118	104.7	104.0	103.3	102.6	101.8	101.0	100.2	99.4	98.6	97.8	97.0	242
119	105.5	204.8	104.1	103.4	102.6	101.8	101.0	100.2	99.4	98.6	97.8	241
120	106.4	105.7	104.9	104.2	103.4	102.6	101.8	101.0	100.2	99.4	98.6	240
121	107.2	106.5	105.7	105.0	104.2	103.4	102.6	101.8	101.0	100.2	99.4	239
122	108.1	107.4	106.6	105.9	105.1	104.3	103.5	102.7	101.9	101.1	100.2	238
123	109.0	108.3	107.5	106.7	105.9	105.1	104.3	103.5	102.7	101.9	101.0	237
124	109.9	109.2	108.4	107.6	106.8	106.0	105.2	104.4	103.6	102.8	101.9	236
125	110.8	110.1	109.3	108.5	107.7	106.9	106.1	105.3	104.4	103.6	102.7	235
126	111.7	111.0	110.2	109.4	108.6	107.8	107.0	106.2	105.3	104.5	103.6	234
127	112.6	111.9	111.1	110.3	109.5	108.7	107.9	107.1	106.2	105.4	104.5	233
128	113.5	112.8	112.0	111.2	110.4	109.6	108.8	108.0	107.1	106.3	105.4	232
129	114.4	113.7	112.9	112.1	111.3	110.5	109.7	108.9	108.0	107.2	106.3	231
130	115.3	114.6	113.8	113.0	112.2	111.4	110.6	109.8	108.9	108.1	107.2	230
131	116.2	115.5	114.7	113.9	113.1	112.4	111.6	110.7	109.8	109.0	108.1	229
132	117.2	116.5	115.7	114.9	114.1	113.3	112.5	111.7	110.8	109.9	109.0	228
133	118.1	117.4	116.6	115.8	115.0	114.2	113.4	112.6	111.7	110.8	109.9	227
134	119.1	118.4	117.6	116.8	116.0	115.2	114.4	113.6	112.7	111.8	110.9	226
135	120.1	119.4	118.6	117.8	117.0	116.2	115.4	114.6	113.7	112.8	111.9	225
a \ h	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	h \ a

a \ h	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
90	+ 7.4	+ 8.2	+ 8.9	+ 9.7	+10.4	+11.2	+11.9	+12.6	+13.3	+14.1	+14.8	270
91	+ 8.1	+ 8.9	+ 9.6	+10.4	+11.1	+11.9	+12.6	+13.3	+14.0	+14.8	+15.5	269
92	+ 8.8	+ 9.5	+10.2	+11.0	+11.7	+12.5	+13.2	+13.9	+14.6	+15.4	+16.1	268
93	+ 9.5	+10.2	+10.9	+11.7	+12.4	+13.2	+13.9	+14.6	+15.3	+16.1	+16.8	267
94	+10.2	+10.9	+11.6	+12.4	+13.1	+13.8	+14.5	+15.3	+16.0	+16.7	+17.4	266
95	+10.9	+11.6	+12.3	+13.1	+13.8	+14.5	+15.2	+16.0	+16.7	+17.4	+18.1	265
96	+11.5	+12.2	+12.9	+13.7	+14.4	+15.1	+15.8	+16.6	+17.3	+18.0	+18.7	264
97	+12.2	+12.9	+13.6	+14.4	+15.1	+15.8	+16.5	+17.3	+18.0	+18.7	+19.4	263
98	+12.8	+13.6	+14.3	+15.1	+15.8	+16.5	+17.2	+17.9	+18.6	+19.3	+20.0	262
99	+13.5	+14.3	+15.0	+15.8	+16.5	+17.2	+17.9	+18.6	+19.3	+20.0	+20.7	261
100	+14.1	+14.9	+15.6	+16.4	+17.1	+17.8	+18.5	+19.2	+19.9	+20.6	+21.3	260
101	+14.8	+15.6	+16.3	+17.1	+17.8	+18.5	+19.2	+19.9	+20.6	+21.3	+22.0	259
102	+15.5	+16.2	+16.9	+17.7	+18.4	+19.1	+19.8	+20.6	+21.3	+22.0	+22.7	258
103	+16.2	+16.9	+17.6	+18.4	+19.1	+19.8	+20.5	+21.3	+22.0	+22.7	+23.4	257
104	+16.8	+17.5	+18.2	+19.0	+19.7	+20.4	+21.1	+21.9	+22.6	+23.3	+24.0	256
105	+17.5	+18.2	+18.9	+19.7	+10.4	+21.1	+21.8	+22.6	+23.3	+24.0	+24.7	255
106	+18.1	+18.9	+19.6	+20.4	+21.1	+21.8	+22.5	+23.2	+23.9	+24.6	+25.3	254
107	+18.8	+19.6	+20.3	+21.1	+21.8	+22.5	+23.2	+23.9	+24.6	+25.3	+26.0	253
108	+19.4	+20.2	+20.9	+21.7	+22.4	+23.1	+23.8	+24.5	+25.2	+25.9	+26.6	252
109	+20.1	+20.9	+21.6	+22.4	+23.1	+23.8	+24.5	+25.2	+25.9	+26.6	+27.3	251
110	+20.7	+21.5	+22.2	+23.0	+23.7	+24.5	+25.2	+25.9	+26.6	+27.3	+28.0	250
111	+21.4	+22.2	+22.9	+23.7	+24.4	+25.2	+25.9	+26.6	+27.3	+28.0	+28.7	249
112	+22.0	+22.8	+23.5	+24.3	+25.0	+25.8	+26.5	+27.2	+27.9	+28.6	+29.3	248
113	+22.7	+23.5	+24.2	+25.0	+25.7	+26.5	+27.2	+27.9	+28.6	+29.3	+30.0	247
114	+23.3	+24.1	+24.8	+25.6	+26.3	+27.1	+27.8	+28.6	+29.3	+30.0	+30.7	246
115	+24.0	+24.8	+25.5	+26.3	+27.0	+27.8	+28.5	+29.3	+30.0	+30.7	+31.4	245
116	+24.6	+25.4	+26.1	+26.9	+27.6	+28.4	+29.1	+29.9	+30.6	+31.3	+32.0	244
117	+25.3	+26.1	+26.8	+27.6	+28.3	+29.1	+29.8	+30.6	+31.3	+32.0	+32.7	243
118	+25.9	+26.7	+27.4	+28.2	+28.9	+29.7	+30.4	+31.2	+31.9	+32.6	+33.3	242
119	+26.6	+27.4	+28.1	+28.9	+29.6	+30.4	+31.1	+31.9	+32.6	+33.3	+34.0	241
120	+27.2	+28.0	+28.7	+29.5	+30.2	+31.0	+31.7	+32.5	+33.2	+33.9	+34.6	240
121	+27.9	+28.7	+29.4	+30.2	+30.6	+31.7	+32.4	+33.2	+33.9	+34.6	+35.3	239
122	+28.5	+29.3	+30.0	+30.8	+31.5	+32.3	+33.0	+33.8	+34.5	+35.2	+35.9	238
123	+29.2	+30.0	+30.7	+31.5	+32.2	+33.0	+33.7	+34.5	+35.2	+35.9	+36.6	237
124	+29.8	+30.6	+31.3	+32.1	+32.8	+33.6	+34.3	+35.1	+35.8	+36.5	+37.2	236
125	+30.5	+31.3	+32.0	+32.8	+33.5	+34.3	+35.0	+35.8	+36.5	+37.2	+37.9	235
126	+31.1	+31.9	+32.6	+33.4	+34.1	+34.9	+35.6	+36.4	+37.1	+37.8	+38.5	234
127	+31.8	+32.5	+33.2	+34.0	+34.8	+35.6	+36.3	+37.1	+37.8	+38.5	+39.2	233
128	+32.3	+33.1	+33.8	+34.6	+35.4	+36.2	+36.9	+37.7	+38.4	+39.1	+39.8	232
129	+32.9	+33.7	+34.4	+35.2	+36.0	+36.8	+37.6	+38.4	+39.1	+39.8	+40.5	231
130	+33.5	+34.3	+35.0	+35.8	+36.6	+37.4	+38.2	+39.0	+39.7	+40.4	+41.1	230
131	+34.1	+34.9	+35.6	+36.4	+37.2	+38.0	+38.8	+39.6	+40.3	+41.1	+41.8	229
132	+34.6	+35.4	+36.2	+37.0	+37.8	+38.6	+39.4	+40.2	+40.9	+41.7	+42.4	228
133	+35.2	+36.0	+36.8	+37.6	+38.4	+39.2	+40.0	+40.8	+41.6	+42.4	+43.1	227
134	+35.8	+36.6	+37.4	+38.2	+39.0	+39.8	+40.6	+41.4	+42.2	+43.0	+43.7	226
135	+36.4	+37.2	+38.0	+38.8	+39.6	+40.4	+41.2	+42.0	+42.8	+43.6	+44.3	225
a / h	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	h / a

a \ h	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
90	76.4	75.7	74.9	74.2	73.5	72.8	72.0	71.3	70.5	69.8	69.0	270
91	77.1	76.4	75.6	74.9	74.1	73.4	72.6	71.9	71.1	70.4	69.6	269
92	77.8	77.1	76.3	75.6	74.8	74.1	73.3	72.6	71.8	71.1	70.3	268
93	78.5	77.8	77.0	76.3	75.5	74.8	74.0	73.3	72.5	71.7	70.9	267
94	79.2	78.5	77.7	77.0	76.2	75.5	74.7	74.0	73.2	72.4	71.6	266
95	79.9	79.2	78.4	77.7	76.9	76.2	75.4	74.6	73.8	73.0	72.2	265
96	80.6	79.9	79.1	78.4	77.6	76.9	76.1	75.3	74.5	73.7	72.9	264
97	81.3	80.6	79.8	79.0	78.2	77.5	76.7	75.9	75.1	74.3	73.5	263
98	82.0	81.3	80.5	79.7	78.9	78.2	77.4	76.6	75.8	75.0	74.1	262
99	82.7	82.0	81.1	80.4	79.6	78.8	78.0	77.2	76.4	75.6	74.7	261
100	83.4	82.7	81.9	81.1	80.3	79.5	78.7	77.9	77.1	76.3	75.4	260
101	84.1	83.4	82.6	81.8	81.0	80.2	79.4	78.6	77.7	76.9	76.0	259
102	84.8	84.1	83.3	82.5	81.7	80.9	80.1	79.3	78.4	77.6	76.7	258
103	85.5	84.8	84.0	83.2	82.4	81.6	80.8	80.0	79.1	78.3	77.4	257
104	86.3	85.5	84.7	83.9	83.1	82.3	81.5	80.7	79.8	79.0	78.1	256
105	87.0	86.2	85.4	84.6	83.8	83.0	82.2	81.4	80.5	79.6	78.7	255
106	87.8	87.0	86.2	85.4	84.5	83.7	82.9	82.1	81.2	80.3	79.4	254
107	88.5	87.7	86.9	86.1	85.2	84.4	83.6	82.8	81.9	81.0	80.1	253
108	89.3	88.5	87.7	86.9	86.0	85.2	84.3	83.2	82.6	81.7	80.8	252
109	90.0	89.2	88.4	87.6	86.7	85.9	85.0	84.2	83.3	82.4	81.4	251
110	90.8	90.0	89.1	88.3	87.4	86.6	85.7	84.9	84.0	83.1	82.1	250
111	91.5	90.7	89.8	89.0	88.1	87.3	86.4	85.6	84.7	83.8	82.8	249
112	92.3	91.5	90.6	89.8	88.9	88.1	87.2	86.3	85.4	84.5	83.5	248
113	93.0	92.2	91.3	90.5	89.6	88.8	87.9	87.0	86.1	85.2	84.2	247
114	93.8	93.0	92.1	91.3	90.4	89.5	88.6	87.7	86.8	85.9	84.9	246
115	94.6	93.8	92.9	92.0	91.1	90.2	89.3	88.4	87.5	86.6	85.6	245
116	95.4	94.6	93.7	92.8	91.9	91.0	90.1	89.2	88.2	87.3	86.3	244
117	96.2	95.3	94.4	93.5	92.6	91.7	90.8	89.9	88.9	88.0	87.0	243
118	97.0	96.1	95.2	94.3	93.4	92.5	91.6	90.7	89.7	88.7	87.7	242
119	97.8	96.9	96.0	95.1	94.2	93.3	92.3	91.4	90.4	89.4	88.4	241
120	98.6	97.7	96.8	95.9	95.0	94.1	93.1	92.2	91.2	90.2	89.2	240
121	99.4	98.5	97.6	96.7	95.8	94.9	93.9	92.9	91.9	90.9	89.9	239
122	190.2	99.3	98.4	97.5	96.6	95.7	94.7	93.7	92.7	91.7	90.6	238
123	101.0	100.1	99.2	98.3	97.4	96.5	95.5	94.5	93.5	92.5	91.4	237
124	101.9	101.0	101.1	99.2	98.3	97.3	96.3	95.3	94.3	93.3	92.2	236
125	102.7	101.8	109.9	100.0	99.1	98.1	97.1	96.1	95.1	94.1	93.0	235
126	103.6	102.7	101.8	100.9	99.9	99.0	98.0	97.0	95.9	94.9	93.8	234
127	104.5	103.6	102.6	101.7	100.7	99.8	98.8	97.8	96.7	95.7	94.6	233
128	105.4	104.5	103.5	102.6	101.6	100.7	99.7	98.7	97.6	96.5	95.4	232
129	106.3	105.4	104.4	103.5	102.5	101.5	100.5	99.5	98.4	97.3	96.2	231
130	107.2	106.3	105.3	104.4	103.4	102.4	101.4	100.4	99.3	98.2	97.0	230
131	108.1	107.2	106.2	105.3	104.3	103.3	103.3	101.2	100.1	99.0	97.8	229
132	109.0	108.1	107.1	106.2	105.2	104.2	103.2	102.1	101.0	99.9	98.7	228
133	109.9	109.0	108.0	107.1	106.1	105.1	104.1	103.0	101.9	100.8	99.6	227
134	110.9	110.9	109.0	108.1	107.1	106.0	105.0	103.9	102.8	101.6	100.5	226
135	111.9	111.0	110.0	109.0	108.0	107.0	106.0	104.9	103.8	102.6	101.4	225
a / h	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	h \ a

a h	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	h a
°	°	°	°	°	°	°	°	°	°	°	°	°
90	+14.8	+15.5	+16.2	+17.0	+17.7	+18.4	+19.1	+19.8	+20.5	+21.2	+21.9	270
91	+15.5	+16.2	+16.9	+17.6	+18.3	+19.0	+19.7	+20.4	+21.1	+21.8	+22.5	269
92	+16.1	+16.8	+17.5	+18.2	+18.9	+19.6	+20.3	+21.0	+21.7	+22.4	+23.1	268
93	+16.8	+17.5	+18.2	+18.9	+19.6	+20.3	+21.0	+21.7	+22.4	+23.1	+23.8	267
94	+17.4	+18.1	+18.8	+19.5	+20.2	+20.9	+21.6	+22.3	+23.0	+23.7	+24.4	266
95	+18.1	+18.8	+19.5	+20.2	+20.9	+21.6	+22.3	+23.0	+23.7	+24.4	+25.1	265
96	+18.7	+19.5	+20.1	+20.8	+21.5	+22.2	+22.9	+23.6	+24.3	+25.0	+25.7	264
97	+19.4	+20.1	+20.8	+21.5	+22.2	+22.9	+23.6	+24.3	+25.0	+25.7	+26.4	263
98	+20.0	+20.7	+21.4	+22.1	+22.8	+23.5	+24.2	+24.9	+25.6	+26.3	+27.0	262
99	+20.7	+21.4	+22.1	+22.8	+23.5	+24.2	+24.9	+25.6	+26.3	+27.0	+27.7	261
100	+21.3	+22.0	+22.7	+23.4	+24.1	+24.8	+25.5	+26.2	+26.9	+27.6	+28.3	260
101	+22.0	+22.7	+23.4	+24.1	+24.8	+25.5	+26.2	+26.9	+27.6	+28.3	+28.9	259
102	+22.7	+23.4	+24.1	+24.8	+25.5	+26.2	+26.9	+27.6	+28.2	+28.9	+29.5	258
103	+23.4	+24.1	+24.8	+25.5	+26.2	+26.9	+27.6	+28.3	+28.9	+29.6	+30.2	257
104	+24.0	+24.7	+25.4	+26.1	+26.8	+27.5	+28.2	+28.9	+29.5	+30.2	+30.8	256
105	+24.7	+25.4	+26.1	+26.8	+27.5	+28.2	+28.9	+29.6	+30.2	+30.9	+31.5	255
106	+25.3	+26.0	+26.7	+37.4	+28.1	+28.8	+29.5	+30.2	+30.8	+31.5	+32.1	254
107	+26.0	+26.7	+27.4	+28.1	+28.8	+29.5	+30.2	+30.9	+31.5	+32.2	+32.8	253
108	+26.6	+27.3	+28.0	+28.7	+29.4	+30.1	+30.8	+31.5	+32.1	+32.8	+33.4	252
109	+27.3	+28.0	+28.7	+29.4	+30.1	+30.8	+31.5	+32.2	+32.8	+33.5	+34.1	251
110	+28.0	+28.7	+29.4	+30.1	+30.8	+31.5	+32.2	+32.9	+33.5	+34.2	+34.8	250
111	+28.7	+29.4	+30.1	+30.8	+31.5	+32.2	+32.9	+33.6	+34.2	+34.9	+35.5	249
112	+29.3	+30.0	+30.7	+31.4	+32.1	+32.8	+33.5	+34.2	+34.8	+35.5	+36.1	248
113	+30.0	+30.7	+31.4	+32.1	+32.8	+33.5	+34.2	+34.9	+35.5	+36.2	+26.8	247
114	+30.7	+31.4	+32.1	+32.8	+33.5	+34.2	+34.8	+35.5	+36.1	+36.8	+37.4	246
115	+31.4	+32.1	+32.8	+33.5	+34.2	+34.9	+35.5	+26.2	+36.8	+37.5	+38.1	245
116	+32.0	+32.7	+33.4	+34.1	+34.8	+35.5	+36.1	+36.8	+37.4	+38.1	+38.7	244
117	+32.7	+33.4	+34.1	+34.8	+35.5	+36.2	+36.8	+37.5	+38.1	+38.8	+39.4	243
118	+33.3	+34.0	+34.7	+35.4	+36.1	+36.8	+37.5	+38.2	+38.8	+39.5	+40.1	242
119	+34.0	+34.7	+35.4	+36.1	+36.8	+37.5	+38.2	+38.9	+39.5	+40.2	+40.8	241
120	+34.6	+35.3	+36.0	+36.7	+37.4	+38.1	+38.8	+39.5	+40.1	+40.8	+41.4	240
121	+35.3	+36.0	+36.7	+37.4	+38.1	+38.8	+39.5	+40.2	+40.8	+41.5	+42.1	239
122	+35.9	+36.7	+37.4	+38.1	+38.8	+39.5	+40.2	+40.9	+41.5	+42.2	+42.8	238
123	+36.6	+37.4	+38.1	+38.8	+39.5	+40.2	+40.9	+41.6	+42.2	+42.9	+43.5	237
124	+37.2	+38.0	+38.7	+39.4	+40.1	+40.8	+41.5	+42.2	+42.8	+43.5	+44.1	236
125	+37.9	+38.7	+39.4	+40.1	+40.8	+41.5	+42.2	+42.9	+43.5	+44.2	+44.8	235
126	+38.5	+39.3	+40.0	+40.7	+41.4	+42.1	+42.8	+43.5	+44.1	+44.8	+45.4	234
127	+39.2	+40.0	+40.7	+41.4	+42.1	+42.8	+43.5	+44.2	+44.8	+45.5	+46.1	233
128	+39.8	+40.6	+41.3	+42.0	+42.7	+43.4	+44.1	+44.8	+45.5	+46.1	+46.7	232
129	+40.5	+41.3	+42.0	+42.7	+43.4	+44.1	+44.8	+45.5	+46.1	+46.8	+47.4	231
130	+41.1	+41.9	+42.6	+43.3	+44.0	+44.7	+45.4	+46.1	+46.7	+47.4	+48.0	230
131	+41.8	+42.6	+43.3	+44.0	+44.7	+45.4	+46.1	+46.8	+47.4	+48.1	+48.7	229
132	+42.4	+43.2	+43.9	+44.6	+45.3	+46.0	+46.7	+47.4	+48.1	+48.7	+49.3	228
133	+43.1	+43.9	+44.6	+45.3	+46.0	+46.7	+47.4	+48.1	+48.7	+49.4	+50.0	227
134	+43.7	+44.5	+45.2	+45.9	+46.6	+47.3	+48.0	+48.7	+49.3	+50.0	+50.7	226
135	+44.3	+45.1	+45.8	+46.5	+47.2	+47.9	+48.6	+49.3	+50.0	+50.7	+51.4	225
a h	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	h a

h / a	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
90	69.0	68.2	67.4	66.6	65.8	65.0	64.2	63.4	62.5	61.7	60.8	270
91	69.6	68.8	68.0	67.2	66.4	65.6	64.8	64.0	63.1	62.2	61.3	269
92	70.3	69.5	68.7	67.9	67.1	66.3	65.4	64.6	63.7	62.8	61.9	268
93	70.9	70.1	69.3	68.5	67.7	66.9	66.0	65.1	64.2	63.3	62.4	267
94	71.6	70.8	69.9	69.1	68.3	67.5	66.6	65.7	64.8	63.9	63.0	266
95	72.2	71.4	70.5	69.7	68.9	68.1	67.2	66.3	65.4	64.5	63.6	265
96	72.9	72.1	71.2	70.4	69.5	68.7	67.8	66.9	66.0	65.1	64.2	264
97	73.5	72.7	71.8	71.0	70.1	69.3	68.4	67.5	66.6	65.7	64.7	263
98	74.1	73.3	72.4	71.6	70.7	69.9	69.0	68.1	67.2	66.3	65.3	262
99	74.7	73.9	73.0	72.1	71.3	70.5	69.6	68.7	67.7	66.8	65.8	261
100	75.4	74.6	73.7	72.9	72.0	71.1	70.2	69.3	68.3	67.4	66.4	260
101	76.0	75.2	74.3	73.5	72.6	71.7	70.8	69.9	68.9	67.9	66.9	259
102	76.7	75.9	75.0	74.1	73.2	72.3	71.4	70.5	69.5	68.5	67.5	258
103	77.4	76.5	75.6	74.7	73.8	72.9	72.0	71.1	70.1	69.1	68.1	257
104	78.1	77.2	76.3	75.4	74.5	73.6	72.6	71.7	70.7	69.7	68.7	256
105	78.7	77.8	76.9	76.0	75.1	74.2	73.2	72.2	71.2	70.2	69.2	255
106	79.4	78.5	77.6	76.7	75.7	74.8	73.8	72.8	71.8	70.8	69.8	254
107	80.1	79.2	78.2	77.3	76.3	75.4	74.4	73.4	72.4	71.4	70.3	253
108	80.8	79.9	78.9	78.0	77.0	76.0	75.0	74.0	73.0	72.0	70.9	252
109	81.4	80.5	79.5	78.6	77.6	76.6	75.6	74.6	73.6	72.5	71.4	251
110	82.1	81.2	80.2	79.3	78.3	77.3	76.3	75.3	74.2	73.1	72.0	250
111	82.8	81.9	80.9	79.9	78.9	77.9	76.9	75.9	74.8	73.7	72.6	249
112	83.5	82.6	81.6	80.6	79.6	78.5	77.5	76.5	75.4	74.3	73.2	248
113	84.2	83.2	82.2	81.2	80.2	79.2	78.1	77.1	76.0	74.9	73.7	247
114	84.9	83.9	82.9	81.9	80.9	79.9	78.8	77.7	76.6	75.5	74.3	246
115	85.6	84.6	83.6	82.6	81.5	80.5	79.4	78.3	77.2	76.1	74.9	245
116	86.3	85.3	84.3	83.3	82.2	81.2	80.1	79.0	77.8	76.7	75.5	244
117	87.0	86.0	85.0	84.0	82.9	81.8	80.7	79.6	78.4	77.3	76.1	243
118	87.7	86.7	85.7	84.7	83.6	82.5	81.4	80.3	79.1	77.9	76.7	242
119	88.4	87.4	86.4	85.3	84.2	83.1	82.0	80.9	79.7	78.5	77.3	241
120	89.2	88.2	87.1	86.0	84.9	83.8	82.7	81.6	80.4	79.2	77.9	240
121	89.9	88.9	87.8	86.7	85.6	84.5	83.3	82.2	81.0	79.8	78.5	239
122	90.6	89.9	88.5	87.4	86.3	85.2	84.0	82.8	81.6	80.4	79.1	238
123	91.4	90.3	89.2	88.1	87.0	85.9	84.7	83.[illegible]	82.2	81.0	79.7	237
124	92.6	91.1	90.0	88.9	87.8	86.6	85.4	84.2	82.9	81.6	80.3	236
125	93.0	91.9	90.7	89.6	88.5	87.3	86.1	84.8	83.5	82.2	80.9	235
126	93.8	92.7	91.5	90.4	89.2	88.0	86.8	85.5	84.2	82.9	81.5	234
127	94.6	93.4	92.3	91.1	89.9	88.7	87.5	86.2	84.9	83.5	82.1	233
128	95.4	94.3	93.1	91.9	90.7	89.5	88.2	86.9	85.6	84.2	82.8	232
129	96.2	95.1	93.9	92.7	91.4	90.2	88.9	87.6	86.2	84.8	83.4	231
130	97.0	95.9	94.7	93.5	92.2	90.9	89.6	88.3	86.9	85.5	84.1	230
131	97.8	96.7	95.[illegible]	94.3	93.0	91.7	90.3	89.0	87.6	86.2	84.7	229
132	98.7	97.5	96.3	95.1	93.8	92.5	91.1	89.7	88.3	86.9	85.4	228
133	99.6	98.4	97.1	95.9	94.6	93.3	91.9	90.5	89.0	87.5	86.0	227
134	100.5	99.3	98.0	96.7	95.4	94.1	92.7	91.3	89.8	88.3	86.7	226
135	101.4	100.2	98.9	97.6	96.2	94.9	93.5	92.0	90.5	89.0	87.4	225
a / h	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	h / a

a \ h	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
90	+21.9	+22.6	+23.3	+24.0	+24.7	+25.4	+26.0	+26.7	+27.3	+28.0	+28.6	270
91	+22.5	+23.2	+23.9	+24.6	+25.3	+26.0	+26.6	+27.3	+27.9	+28.6	+29.2	269
92	+23.1	+23.8	+24.5	+25.2	+25.8	+26.5	+27.2	+27.9	+28.5	+29.2	+29.8	268
93	+23.8	+24.5	+25.1	+25.8	+26.5	+27.2	+27.8	+28.5	+29.1	+29.8	+30.4	267
94	+24.4	+25.1	+25.7	+26.4	+27.1	+27.8	+28.4	+29.1	+29.7	+30.4	+31.0	266
95	+25.1	+25.8	+26.4	+27.1	+27.7	+28.4	+29.0	+29.7	+30.3	+31.0	+31.6	265
96	+25.7	+26.4	+27.0	+27.7	+28.3	+29.0	+29.6	+30.3	+30.9	+31.6	+32.2	264
97	+26.4	+27.1	+27.7	+28.4	+29.0	+29.6	+30.2	+30.9	+31.5	+32.2	+32.8	263
98	+27.0	+27.7	+28.3	+29.0	+29.6	+30.2	+30.8	+31.5	+32.1	+32.8	+33.4	262
99	+27.7	+28.4	+29.0	+29.7	+30.3	+30.9	+31.5	+32.2	+32.8	+33.4	+34.0	261
100	+28.3	+29.0	+29.6	+30.3	+30.9	+31.5	+32.1	+32.8	+33.4	+34.0	+34.6	260
101	+28.9	+29.6	+30.2	+30.9	+31.5	+32.2	+32.8	+33.4	+34.0	+34.6	+35.2	259
102	+29.5	+30.2	+30.8	+31.5	+32.1	+32.8	+33.4	+34.0	+34.6	+35.2	+35.8	258
103	+30.2	+30.9	+31.5	+32.2	+32.8	+33.5	+34.1	+34.7	+35.3	+35.9	+36.5	257
104	+30.8	+31.5	+32.1	+32.8	+33.4	+34.1	+34.7	+35.3	+35.9	+36.5	+37.1	256
105	+31.5	+32.2	+32.8	+33.5	+34.1	+34.7	+35.3	+35.9	+36.5	+37.1	+37.7	255
106	+32.1	+32.8	+33.4	+34.1	+34.7	+35.3	+35.9	+36.5	+37.1	+37.7	+38.3	254
107	+32.8	+33.5	+34.1	+34.8	+35.4	+36.0	+36.6	+37.2	+37.8	+38.4	+39.0	253
108	+33.4	+34.1	+34.7	+35.4	+36.0	+36.6	+37.2	+37.8	+38.4	+39.0	+39.6	252
109	+34.1	+34.8	+35.4	+36.1	+36.7	+37.2	+37.9	+38.5	+39.1	+39.7	+40.3	251
110	+34.8	+35.4	+36.0	+36.7	+37.3	+37.9	+38.5	+39.1	+39.7	+40.3	+40.9	250
111	+35.5	+36.1	+36.7	+37.4	+38.0	+38.6	+39.2	+39.8	+40.4	+41.0	+41.5	249
112	+36.1	+36.8	+37.4	+38.0	+38.6	+39.2	+39.8	+40.4	+41.0	+41.6	+42.1	248
113	+36.8	+37.5	+38.1	+38.1	+39.3	+39.9	+40.5	+41.1	+41.7	+42.3	+42.8	247
114	+37.4	+38.1	+38.7	+39.3	+39.9	+40.5	+41.1	+41.7	+42.3	+42.9	+43.4	246
115	+38.1	+38.8	+39.4	+30.0	+40.6	+41.2	+41.8	+42.4	+43.0	+43.6	+44.1	245
116	+38.7	+39.4	+40.0	+40.6	+41.2	+41.8	+42.4	+43.0	+43.6	+44.2	+44.7	244
117	+39.4	+40.1	+40.7	+41.3	+41.9	+42.5	+43.1	+43.7	+44.3	+44.9	+45.3	243
118	+40.1	+40.7	+41.3	+41.9	+42.5	+43.1	+43.7	+44.3	+44.9	+45.5	+46.0	242
119	+40.8	+41.4	+42.0	+42.6	+43.2	+43.8	+44.4	+45.0	+45.6	+46.2	+46.7	241
120	+41.4	+42.1	+42.7	+43.3	+43.9	+44.5	+45.1	+45.7	+46.2	+46.8	+47.3	240
121	+42.1	+42.8	+43.4	+44.0	+44.6	+45.2	+45.8	+46.4	+46.9	+47.5	+48.0	239
122	+42.8	+43.4	+44.0	+44.6	+45.2	+45.8	+46.4	+47.0	+47.5	+48.1	+48.6	238
123	+43.5	+44.1	+44.7	+45.3	+45.9	+46.5	+47.1	+47.7	+48.2	+48.8	+49.3	237
124	+44.1	+44.7	+45.3	+45.9	+46.5	+47.1	+47.7	+48.3	+48.8	+49.4	+49.9	236
125	+44.8	+45.3	+46.0	+46.6	+47.2	+47.8	+48.4	+49.0	+49.5	+50.1	+50.6	235
126	+45.4	+46.0	+46.6	+47.2	+47.8	+48.4	+49.0	+49.6	+50.1	+50.7	+51.2	234
127	+46.1	+46.7	+47.3	+47.9	+48.5	+49.1	+49.7	+50.3	+50.8	+51.4	+51.9	233
128	+46.7	+47.4	+48.0	+48.6	+49.2	+49.8	+50.4	+51.0	+51.5	+52.0	+52.5	232
129	+47.4	+48.1	+48.7	+49.3	+49.9	+50.5	+51.1	+51.7	+52.2	+52.7	+53.2	231
130	+48.0	+48.7	+49.3	+49.9	+50.5	+51.1	+51.7	+52.3	+52.8	+53.3	+53.8	230
131	+48.7	+49.4	+50.0	+50.6	+51.2	+51.8	+52.4	+53.0	+53.5	+54.0	+54.5	229
132	+49.3	+50.0	+50.6	+51.2	+51.8	+52.4	+53.0	+53.6	+54.1	+54.7	+55.2	228
133	+50.0	+50.7	+51.3	+51.9	+52.5	+53.1	+53.7	+54.3	+54.8	+55.4	+55.9	227
134	+50.7	+51.4	+52.0	+52.6	+53.2	+53.8	+54.3	+54.9	+55.4	+56.0	+56.5	226
135	+51.4	+52.1	+52.7	+53.3	+53.9	+54.5	+55.0	+55.6	+56.1	+56.6	+57.1	225
a \ b	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	b \ a

a \ h	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
90	60.8	59.9	59.0	58.1	57.2	56.3	55.4	54.5	53.5	52.5	51.5	270
91	61.3	60.5	59.6	58.7	57.8	56.9	55.9	55.0	54.0	53.0	52.0	269
92	61.9	61.0	60.1	59.2	58.3	57.4	56.4	55.5	54.5	53.5	52.5	268
93	62.4	61.6	60.7	59.8	58.9	57.9	56.9	56.0	55.0	54.0	53.0	267
94	63.0	62.1	61.2	60.3	59.4	58.4	57.4	56.4	55.4	54.4	53.4	266
95	63.6	62.7	61.8	60.9	59.9	58.9	57.9	56.9	55.9	54.9	53.8	265
96	64.2	63.3	62.3	61.4	60.4	59.4	58.4	57.4	56.3	55.3	54.2	264
97	64.7	63.8	62.9	61.9	60.9	59.9	58.9	57.9	56.8	55.8	54.7	263
98	65.3	64.4	63.4	62.4	61.4	60.4	59.3	58.3	57.2	56.2	55.1	262
99	65.8	64.9	63.9	62.9	61.9	60.9	59.8	58.8	57.7	56.7	55.6	261
100	66.4	65.4	64.4	63.4	62.4	61.4	60.3	59.3	58.2	57.1	56.0	260
101	66.9	65.9	64.9	64.0	63.0	61.9	60.8	59.8	58.7	57.6	56.4	259
102	67.5	66.5	65.5	64.5	63.5	62.4	61.3	60.2	59.1	58.0	56.8	258
103	68.1	67.1	66.0	65.0	64.0	62.9	61.8	60.7	59.6	58.4	57.2	257
104	68.7	67.7	66.6	65.6	64.5	63.4	62.3	61.2	60.0	58.8	57.6	256
105	69.2	68.2	67.1	66.1	65.0	63.9	62.8	61.7	60.5	59.3	58.1	255
106	69.8	68.8	67.7	66.6	65.5	64.4	63.2	62.1	60.9	59.7	58.5	254
107	70.3	69.3	68.2	67.1	66.0	64.9	63.7	62.5	61.4	60.2	58.9	253
108	70.9	69.8	68.7	67.6	66.5	65.4	64.2	63.0	61.8	60.6	59.3	252
109	71.4	70.3	69.2	68.1	67.0	65.9	64.7	63.5	62.3	61.1	59.8	251
110	72.0	70.9	69.8	68.7	67.5	66.4	65.2	64.0	62.7	61.5	60.2	250
111	72.6	71.5	70.3	69.2	68.0	66.9	65.7	64.5	63.2	61.9	60.6	249
112	73.2	72.1	70.9	69.7	68.5	67.3	66.1	64.9	63.6	62.3	61.0	248
113	73.7	72.6	71.4	70.3	69.1	67.9	66.6	65.4	64.1	62.8	61.4	247
114	74.3	73.2	72.0	70.8	69.6	68.4	67.1	65.8	64.5	63.2	61.8	246
115	74.9	73.7	72.5	71.3	70.1	68.9	67.6	66.3	64.9	63.6	62.2	245
116	75.5	74.3	73.1	71.9	70.6	69.3	68.0	66.7	65.3	63.9	62.5	244
117	76.1	74.9	73.6	72.4	71.1	69.8	68.5	67.1	65.7	64.3	62.9	243
118	76.7	75.5	74.2	72.9	71.6	70.3	68.9	67.5	66.1	64.7	63.3	242
119	77.3	76.0	74.7	73.4	72.1	70.8	69.4	68.0	66.6	65.1	63.7	241
120	77.9	76.6	75.3	74.0	72.6	71.2	69.8	68.4	67.0	65.5	54.0	240
121	78.5	77.1	75.8	74.5	73.1	71.7	70.3	68.9	67.4	65.9	64.4	239
122	79.1	77.8	76.4	75.1	73.7	72.3	70.8	69.4	67.8	66.3	64.8	238
123	79.7	78.4	77.0	75.6	74.2	72.8	71.3	69.8	68.3	66.8	65.2	237
124	80.3	79.0	77.6	76.2	74.7	73.2	71.7	70.2	68.7	67.2	65.6	236
125	80.9	79.6	78.2	76.7	75.2	73.7	72.2	70.7	69.1	67.6	66.0	235
126	81.5	80.2	78.8	77.3	75.8	74.3	72.7	71.1	69.5	67.9	66.3	234
127	82.1	80.8	79.3	77.8	76.3	74.8	73.2	71.6	70.0	68.3	66.7	233
128	82.8	81.4	79.9	78.4	76.8	75.3	73.7	72.1	70.4	68.7	67.0	232
129	83.4	82.0	80.5	78.9	77.3	75.8	74.2	72.5	70.8	69.1	67.4	231
130	84.1	82.6	81.1	79.5	77.9	76.3	74.6	72.9	71.2	69.5	67.7	230
131	84.7	83.2	81.7	80.1	78.4	76.8	75.1	73.4	71.6	69.8	68.0	229
132	85.4	83.9	82.3	80.7	79.0	77.3	75.6	73.8	72.0	70.2	68.3	228
133	86.0	84.5	82.9	81.2	79.5	77.8	76.1	74.3	72.4	70.5	68.6	227
134	86.7	85.1	83.5	81.8	80.1	78.3	76.5	74.7	72.8	70.8	68.9	226
135	87.4	85.8	84.1	82.4	80.6	78.8	77.0	75.1	73.2	71.2	69.2	225
a / h	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	h / a

a \ h	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
90	+28.6	+29.3	+29.9	+30.6	+31.2	+31.9	+32.5	+33.1	+33.7	+34.3	+34.8	270
91	+29.2	+29.9	+30.5	+31.2	+31.8	+32.4	+33.0	+33.6	+34.2	+34.8	+35.4	269
92	+29.8	+30.5	+31.1	+31.7	+32.3	+32.9	+33.5	+34.1	+34.7	+35.3	+35.9	268
93	+30.4	+31.1	+31.7	+32.3	+32.9	+33.5	+34.1	+34.7	+35.3	+35.9	+36.4	267
94	+31.0	+31.6	+32.2	+32.8	+33.4	+34.0	+34.6	+35.2	+35.8	+36.4	+36.9	266
95	+31.6	+32.2	+32.8	+33.4	+34.0	+34.6	+35.2	+35.8	+36.4	+37.0	+37.5	265
96	+32.2	+32.8	+33.4	+34.0	+34.6	+35.2	+35.8	+36.4	+36.9	+37.5	+38.0	264
97	+32.8	+33.4	+34.0	+34.6	+35.2	+35.8	+36.4	+37.0	+37.5	+38.1	+38.6	263
98	+33.4	+34.0	+34.6	+35.2	+35.8	+36.4	+36.9	+37.5	+38.0	+38.6	+39.1	262
99	+34.0	+34.6	+35.2	+35.8	+36.4	+37.0	+37.5	+38.1	+38.6	+39.2	+39.7	261
100	+34.6	+35.2	+35.8	+36.4	+37.0	+37.6	+38.1	+38.7	+39.2	+39.7	+40.2	260
101	+35.2	+35.8	+36.4	+37.0	+37.6	+38.2	+38.7	+39.3	+39.8	+40.3	+40.8	259
102	+35.8	+36.4	+37.0	+37.6	+38.1	+38.7	+39.2	+39.8	+40.3	+40.8	+41.3	258
103	+36.5	+37.1	+37.6	+38.2	+38.7	+39.3	+39.8	+40.4	+40.9	+41.4	+41.9	257
104	+37.1	+37.7	+38.2	+38.8	+39.3	+39.9	+40.4	+41.0	+41.5	+42.0	+42.5	256
105	+37.7	+38.3	+38.8	+39.4	+39.9	+40.5	+41.0	+41.6	+42.1	+42.6	+43.1	255
106	+38.3	+38.9	+39.4	+40.0	+40.5	+41.1	+41.6	+42.1	+42.6	+43.1	+43.6	254
107	+39.0	+39.6	+40.1	+40.7	+41.2	+41.7	+42.2	+42.7	+43.2	+43.7	+44.2	253
108	+39.6	+40.2	+40.7	+41.3	+41.8	+42.3	+42.8	+43.3	+43.8	+44.3	+44.7	252
109	+40.3	+40.9	+41.4	+41.9	+42.4	+42.9	+43.4	+43.9	+44.4	+44.9	+45.3	251
110	+40.9	+41.5	+42.0	+42.5	+43.0	+43.5	+44.0	+44.5	+44.9	+45.4	+45.8	250
111	+41.5	+42.1	+42.6	+43.1	+43.6	+44.1	+44.6	+45.1	+45.5	+46.0	+46.4	249
112	+42.1	+42.7	+43.2	+43.7	+44.2	+44.7	+45.2	+45.7	+46.1	+46.6	+47.0	248
113	+42.8	+43.3	+43.8	+44.3	+44.8	+45.3	+45.8	+46.3	+46.7	+47.2	+47.6	247
114	+43.4	+43.9	+44.4	+44.9	+45.4	+45.9	+46.4	+46.9	+47.3	+47.7	+48.1	246
115	+44.1	+44.6	+45.1	+45.6	+46.1	+46.6	+47.0	+47.5	+47.9	+48.3	+48.7	245
116	+44.7	+45.2	+45.7	+46.2	+46.7	+47.2	+47.6	+48.1	+48.5	+48.9	+49.3	244
117	+45.3	+45.9	+46.4	+46.9	+47.4	+47.8	+48.3	+48.7	+49.1	+49.5	+50.0	243
118	+46.0	+46.5	+47.0	+47.5	+48.0	+48.5	+48.9	+49.3	+49.7	+50.1	+50.5	242
119	+46.7	+47.2	+47.7	+48.2	+48.7	+49.2	+49.6	+50.0	+50.4	+50.8	+51.1	241
120	+47.3	+47.8	+48.3	+48.8	+49.3	+49.8	+50.2	+50.6	+51.0	+51.4	+51.7	240
121	+48.0	+48.5	+49.0	+49.5	+49.9	+50.4	+50.8	+51.2	+51.6	+52.0	+52.3	239
122	+48.6	+49.1	+49.6	+50.1	+50.5	+51.0	+51.4	+51.8	+52.2	+52.6	+52.9	238
123	+49.3	+49.8	+50.3	+50.8	+51.2	+51.7	+52.1	+52.5	+52.9	+53.3	+53.6	237
124	+49.9	+50.4	+50.9	+51.4	+51.8	+52.3	+52.7	+53.1	+53.5	+53.9	+54.2	236
125	+50.6	+51.1	+51.6	+52.1	+52.5	+52.9	+53.3	+53.7	+54.1	+54.5	+54.8	235
126	+51.2	+51.7	+52.2	+52.7	+53.1	+53.5	+53.9	+54.3	+54.7	+55.1	+55.4	234
127	+51.9	+52.4	+52.9	+53.4	+53.8	+54.2	+54.6	+55.0	+55.4	+55.7	+56.0	233
128	+52.5	+53.0	+53.5	+54.0	+54.4	+54.8	+55.2	+55.6	+56.0	+56.3	+56.6	232
129	+53.2	+53.7	+54.2	+54.7	+55.1	+55.5	+55.9	+56.3	+56.6	+56.9	+57.2	231
130	+53.8	+54.3	+54.8	+55.3	+55.7	+56.1	+56.5	+56.9	+57.2	+57.5	+57.8	230
131	+54.5	+55.0	+55.5	+56.0	+56.4	+56.8	+57.2	+57.6	+57.9	+58.2	+58.5	229
132	+55.2	+55.7	+56.1	+56.6	+57.0	+57.4	+57.8	+58.2	+58.5	+58.8	+59.1	228
133	+55.9	+56.4	+56.8	+57.3	+57.7	+58.1	+58.4	+58.8	+59.1	+59.4	+59.7	227
134	+56.5	+57.0	+57.4	+57.9	+58.3	+58.7	+59.0	+59.4	+59.7	+60.0	+60.3	226
135	+57.1	+57.6	+58.0	+58.5	+58.9	+59.3	+59.6	+60.0	+60.4	+60.7	+61.0	225
a \ h	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	h \ a

a \ h	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
90	51.5	50.5	49.5	48.5	47.4	46.4	45.3	44.2	43.1	42.0	40.9	270
91	52.0	51.0	50.0	49.0	47.9	46.8	45.7	44.6	43.5	42.4	41.2	269
92	52.5	51.5	50.4	49.4	48.3	47.2	46.1	45.0	43.8	42.7	41.5	268
93	53.0	52.0	50.9	49.8	48.7	47.6	46.5	45.4	44.2	43.0	41.8	267
94	53.4	52.4	51.3	50.2	49.1	48.0	46.8	45.7	44.5	43.3	42.1	266
95	53.8	52.8	51.7	50.6	49.5	48.4	47.2	46.0	44.8	43.6	42.4	265
96	54.2	53.2	52.1	51.0	49.8	48.7	47.5	46.3	45.1	43.9	42.7	264
97	54.7	53.6	52.5	51.4	50.2	49.1	47.9	46.7	45.5	44.3	43.0	263
98	55.1	54.0	52.9	51.8	50.6	49.4	48.2	47.0	45.8	44.6	43.3	262
99	55.6	54.5	53.3	52.2	51.0	49.8	48.6	47.4	46.1	44.9	43.6	261
100	56.0	54.9	53.7	52.5	51.3	50.1	48.9	47.7	46.4	45.2	43.9	260
101	56.4	55.3	54.1	52.9	51.7	50.5	49.3	48.0	46.7	45.5	44.2	259
102	56.8	55.6	54.4	53.2	52.0	50.8	49.6	48.3	47.0	45.7	44.4	258
103	57.2	56.0	54.8	53.6	52.4	51.2	49.9	48.6	47.3	46.0	44.7	257
104	57.6	56.4	55.2	54.0	52.7	51.5	50.2	48.9	47.6	46.3	44.9	256
105	58.1	56.9	55.6	54.4	53.1	51.9	50.6	49.3	47.9	46.5	45.1	255
106	58.5	57.3	56.0	54.8	53.5	52.2	50.9	49.6	48.2	46.8	45.4	254
107	58.9	57.7	56.4	55.2	53.9	52.6	51.2	49.9	48.5	47.1	45.6	253
108	59.3	58.1	56.8	55.5	54.2	52.9	51.5	50.1	48.7	47.3	45.8	252
109	59.8	58.5	57.2	55.9	54.6	53.2	51.8	50.4	49.0	47.6	46.1	251
110	60.2	58.9	57.6	56.3	54.9	53.5	52.1	50.7	49.2	47.8	46.3	250
111	60.6	59.3	58.0	56.6	55.2	53.8	52.4	51.0	49.5	48.0	46.5	249
112	61.0	59.7	58.3	56.9	55.5	54.1	52.6	51.2	49.7	48.2	46.7	248
113	61.4	60.1	58.7	57.3	55.8	54.4	52.9	51.5	50.0	48.5	46.9	247
114	61.8	60.4	59.0	57.6	56.1	54.7	53.2	51.7	50.2	48.7	47.1	246
115	62.2	60.8	59.4	57.9	56.4	55.0	53.5	51.9	50.4	48.9	47.3	245
116	62.5	61.1	59.7	58.2	56.7	55.2	53.7	52.2	50.6	49.0	47.4	244
117	62.9	61.5	60.1	58.6	57.0	55.5	54.0	52.4	50.8	49.2	47.6	243
118	63.3	61.9	60.4	58.9	57.3	55.8	54.2	52.6	51.0	49.4	47.7	242
119	63.7	62.2	60.7	59.2	57.6	56.0	54.4	52.8	51.2	49.5	47.8	241
120	64.0	62.5	61.0	59.4	57.8	56.2	54.6	53.0	51.3	49.6	47.9	240
121	64.4	62.9	61.4	59.7	58.1	56.5	54.8	53.2	51.5	49.8	48.0	239
122	64.8	63.3	61.7	60.0	58.4	56.7	55.0	53.3	51.6	49.5	48.1	238
123	65.2	63.6	62.0	60.3	58.7	57.0	55.2	53.5	51.8	59.0	48.2	237
124	65.6	64.0	62.3	60.6	58.9	57.2	55.4	53.7	51.9	50.1	48.3	236
125	66.0	64.3	62.6	60.9	59.2	57.4	55.6	53.9	52.1	50.3	48.4	235
126	66.3	64.6	62.9	61.2	59.4	57.6	55.8	54.0	52.2	50.4	48.5	234
127	66.7	64.9	63.2	61.4	59.6	57.8	56.0	54.2	52.3	50.5	48.6	233
128	67.0	65.2	63.4	61.6	59.8	58.0	56.1	54.3	52.4	50.5	48.6	232
129	67.4	65.6	63.7	61.9	60.0	58.2	56.3	54.4	52.5	50.6	48.6	231
130	67.7	65.9	64.0	62.1	60.2	58.3	56.4	54.5	52.5	50.6	48.6	230
131	68.0	66.2	64.3	62.4	60.4	58.5	56.5	54.6	52.6	50.6	48.6	229
132	68.3	66.4	64.5	62.6	60.6	58.6	56.2	54.6	52.6	50.6	48.6	228
133	68.6	66.7	64.8	62.8	60.8	58.8	56.7	54.7	52.7	50.6	48.6	227
134	68.9	67.0	65.0	63.0	61.0	58.9	56.8	54.8	52.7	50.6	48.5	226
135	69.2	67.3	65.3	63.3	61.2	59.1	56.9	54.8	52.7	50.6	48.4	225
a \ h	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	h \ a

h a	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	h a
°	°	°	°	°	°	°	°	°	°	°	°	°
90	+34.8	+35.4	+36.0	+36.6	+37.1	+37.7	+38.2	+38.7	+39.2	+39.7	+40.2	270
91	+35.4	+36.0	+36.5	+37.1	+37.6	+38.2	+38.7	+39.2	+39.7	+40.2	+40.7	269
92	+35.9	+36.5	+37.0	+37.6	+38.1	+38.6	+39.1	+39.6	+40.1	+40.6	+41.1	268
93	+36.4	+37.0	+37.5	+38.1	+38.6	+39.1	+39.6	+49.1	+40.6	+41.1	+41.6	267
94	+36.9	+37.5	+38.0	+38.6	+39.1	+39.6	+40.1	+40.6	+41.1	+41.6	+42.0	266
95	+37.5	+38.1	+38.6	+39.1	+39.6	+40.1	+40.6	+41.1	+41.6	+42.1	+42.5	265
96	+38.0	+38.6	+39.1	+39.6	+40.1	+40.6	+41.1	+41.6	+42.0	+42.5	+42.9	264
97	+38.6	+39.1	+39.6	+40.1	+40.6	+41.1	+41.6	+42.1	+42.5	+43.0	+43.4	263
98	+39.1	+39.6	+40.1	+40.6	+41.1	+41.6	+42.1	+42.6	+43.0	+43.4	+43.8	262
99	+39.7	+40.2	+40.7	+41.2	+41.7	+42.2	+42.6	+43.1	+43.5	+43.9	+44.3	261
100	+40.2	+40.7	+41.2	+41.7	+42.2	+42.7	+43.1	+43.6	+44.0	+44.4	+44.8	260
101	+40.8	+41.3	+41.8	+42.3	+42.7	+43.2	+43.6	+44.1	+44.5	+44.9	+45.3	259
102	+41.3	+41.8	+42.3	+42.8	+43.2	+43.7	+44.1	+44.5	+44.9	+45.3	+45.7	258
103	+41.9	+42.4	+42.9	+43.4	+43.8	+44.2	+44.6	+45.0	+45.4	+45.8	+46.2	257
104	+42.5	+43.0	+43.4	+43.9	+44.3	+44.7	+45.1	+45.5	+45.9	+46.3	+46.6	256
105	+43.1	+43.6	+44.0	+44.4	+44.8	+45.2	+45.6	+46.0	+46.4	+46.8	+47.1	255
106	+43.6	+44.1	+44.5	+44.9	+45.3	+45.7	+46.1	+46.5	+46.8	+47.2	+47.5	254
107	+44.2	+44.7	+45.1	+45.5	+45.9	+46.3	+46.7	+47.0	+47.3	+47.7	+48.0	253
108	+44.7	+45.2	+45.6	+46.0	+46.4	+46.8	+47.2	+47.5	+47.8	+48.2	+48.5	252
109	+45.3	+45.8	+46.2	+46.6	+47.0	+47.4	+47.7	+48.0	+48.3	+48.7	+49.0	251
110	+45.8	+46.3	+46.7	+47.1	+47.5	+47.9	+48.2	+48.5	+48.8	+49.1	+49.4	250
111	+46.4	+46.9	+47.3	+47.7	+48.1	+48.5	+48.8	+49.1	+49.3	+49.6	+49.9	249
112	+47.0	+47.4	+47.8	+48.2	+48.6	+49.0	+49.3	+49.6	+49.8	+50.1	+50.4	248
113	+47.6	+48.0	+48.4	+48.8	+49.2	+49.5	+49.8	+50.1	+50.3	+50.6	+50.3	247
114	+48.1	+48.5	+48.9	+49.3	+49.7	+50.0	+50.3	+50.6	+50.8	+51.1	+51.3	246
115	+48.7	+49.1	+49.5	+49.9	+50.3	+50.6	+50.9	+51.2	+51.4	+51.6	+51.8	245
116	+49.3	+49.7	+50.1	+50.5	+50.8	+51.1	+51.4	+51.7	+51.9	+52.1	+52.3	244
117	+50.0	+50.3	+50.7	+51.0	+51.3	+51.6	+51.9	+52.2	+52.4	+52.6	+52.8	243
118	+50.5	+50.9	+51.2	+51.5	+51.8	+52.1	+52.4	+52.7	+52.9	+53.1	+53.3	242
119	+51.1	+51.5	+51.8	+52.1	+52.4	+52.7	+53.0	+53.2	+53.4	+53.6	+53.8	241
120	+51.7	+52.1	+52.4	+52.7	+53.0	+53.3	+53.5	+53.7	+53.9	+54.1	+54.3	240
121	+52.3	+52.7	+53.0	+53.3	+53.6	+53.9	+54.1	+54.3	+54.5	+54.7	+54.8	239
122	+52.9	+53.3	+53.6	+53.9	+54.1	+54.4	+54.6	+54.8	+55.0	+55.2	+55.3	238
123	+53.6	+53.9	+54.2	+54.5	+54.7	+55.0	+55.2	+55.4	+55.5	+55.7	+55.8	237
124	+54.2	+54.5	+54.8	+55.1	+55.3	+55.5	+55.7	+55.9	+56.0	+56.2	+56.3	236
125	+54.8	+55.1	+55.4	+55.7	+55.9	+56.1	+56.3	+56.5	+56.6	+56.7	+56.8	235
126	+55.4	+55.7	+56.0	+56.2	+56.4	+56.6	+56.8	+57.0	+57.1	+57.2	+57.3	234
127	+56.0	+56.3	+56.6	+56.8	+57.0	+57.2	+57.4	+57.6	+57.6	+57.8	+57.8	233
128	+56.6	+56.9	+57.2	+57.4	+57.6	+57.8	+57.9	+58.1	+58.2	+58.3	+58.3	232
129	+57.2	+57.5	+57.8	+58.0	+58.2	+58.4	+58.5	+58.7	+58.8	+58.8	+58.8	231
130	+57.8	+58.1	+58.4	+58.6	+58.8	+59.0	+59.1	+59.2	+59.3	+59.3	+59.3	230
131	+58.5	+58.8	+59.0	+59.2	+59.4	+59.6	+59.7	+59.8	+59.8	+59.8	+59.8	229
132	+59.1	+59.4	+59.6	+59.8	+60.0	+60.1	+60.2	+60.3	+60.3	+60.3	+60.3	228
133	+59.7	+60.0	+60.2	+60.4	+60.6	+60.7	+60.8	+60.9	+60.9	+60.9	+60.8	227
134	+60.3	+60.6	+60.8	+61.0	+61.1	+61.2	+61.3	+61.4	+61.4	+61.4	+61.3	226
135	+61.0	+61.2	+61.4	+61.6	+61.7	+61.8	+61.9	+61.9	+61.9	+61.9	+61.8	225
a h	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	h a

s^h	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	$^h s$
°	°	°	°	°	°	°	°	°	°	°	°	°
90	40.9	39.8	38.6	37.4	36.2	35.0	33.7	32.5	31.2	29.9	28 6	270
91	41.2	40 1	38.9	37.7	36.5	35.3	34.0	32.7	31.4	30.1	28 8	269
92	41.5	40.3	39.1	37 9	36.7	35.5	34.2	32.9	31.6	30.3	29.0	268
93	41.8	40.6	39.4	38 2	37.0	35.7	34.4	33.1	31.8	30.5	29.2	267
94	42.1	40.9	39.7	38.5	37.2	35.9	34.6	33.3	32.0	30.7	29.3	266
95	42.4	41.2	40.0	38.7	37.4	36.1	34.8	33.5	32.2	30.8	29.4	265
96	42.7	41.5	40.2	38.9	37.6	36.3	35.0	33.7	32.3	30.9	29.5	264
97	43.0	41.8	40.5	39.2	37.9	36.6	35.2	33.9	32.5	31.1	29.7	263
98	43.3	42.0	40.7	39.4	38.1	36.8	35.4	34.0	32.6	31.2	29.8	262
99	43 6	42.3	41.0	39.7	38.3	37.0	35.6	34.2	32.8	31.4	29.9	261
100	43.9	42.6	41.2	39.9	38.5	37.1	35.7	34.3	32.9	31.5	30.0	260
101	44.2	42.9	41.5	40.1	38.7	37.3	35.9	34.5	33.1	31.6	30.1	259
102	44.4	43.1	41.7	40.3	38.9	37.5	36.1	34.7	33.2	31.7	30.2	258
103	44.7	43 3	41.9	40.5	39.1	37.7	36.3	34.8	23.3	31.8	30.3	257
104	44.9	43.5	42 1	40.7	39.3	37.9	36.4	34.9	33.4	31 9	30.4	256
105	45.1	43.7	42.3	40.9	39.5	28.1	36.6	35.1	33.6	32.1	30.5	255
106	45.4	44.0	42.5	41.1	39.6	38.2	36.7	35.2	33.7	32.2	30.6	254
107	45.6	44.2	42.7	41.3	39.8	38.3	36.8	35.3	33.8	32.3	30.7	253
108	45.8	44.4	42.9	41.4	39.9	38.4	36.9	35.4	33.8	32.3	30.7	252
109	46.0	44.6	43.1	41.6	40.1	38.6	37.0	35.6	33.9	32.4	30.8	251
110	46.3	44.8	43.3	41.8	40.2	38.7	37.1	35.6	34.0	32.4	30.8	250
111	46.5	45.0	43.5	42.0	40.4	38.8	37.2	35.7	34.1	32.5	30.8	249
112	46.7	45.2	43.6	42.1	40.5	38.9	37.3	35.7	34.1	32.5	30.8	248
113	46.9	45.4	43.8	42.2	40.6	39 0	37.4	35.8	34.1	32.5	30.8	247
114	47.1	45.5	43.9	42.3	40.7	39.1	37.4	35.8	34.1	32 5	30.8	246
115	47.3	45.7	44 0	42.4	40.8	39.2	37.5	35.9	34.2	32.5	30.8	245
116	47.4	45.8	44.1	42.5	40.8	39.2	37.5	35.9	34.2	32.5	30 8	244
117	47.6	45 9	44.2	42.6	40.9	39.3	37.6	35.9	34.2	32.5	30.8	243
118	47.7	46.0	44.3	42.7	41.0	39.3	37.6	35.9	34.2	32.5	30.8	242
119	47.8	46.1	44.4	42.8	41.1	39.4	37.7	36.0	34.2	32.5	30.8	241
120	47.9	46.2	44.5	42.8	41.1	39.4	37.7	36.0	34.2	32 4	30.7	240
121	48.0	46.3	44.6	42.9	41.1	39.4	37.7	35.9	34.2	32.4	30.7	239
122	48.1	46.4	44.6	42.9	41.1	39.3	37.6	35.8	34.1	32.3	30 6	238
123	48.2	46.5	44.7	42.9	41.1	39.3	37 6	35.8	34.1	32.3	30.5	237
124	48.3	46.5	44.7	42.9	41.1	39.3	37.5	35.7	34.0	32.2	30.4	236
125	48.4	46.6	44 8	43.0	41.1	39.3	37.5	35.7	33.9	32.1	30.3	235
126	48.5	46.7	44 8	43.0	41.1	39 2	37.4	35.6	33.8	31.9	30.1	234
127	48.6	46.7	44 8	42.9	41.1	39.2	37.3	35.5	33.7	31.8	30.0	233
128	48.6	46.7	44.8	42.9	41.0	39.1	37.2	35.3	33.5	31.6	29 8	232
129	48 6	46.7	44.8	42.8	40.9	39.0	37.1	35.2	33.4	31.5	29.7	231
130	48.6	46.7	44.7	42.7	40.8	38.9	37.0	35.1	33.2	31.3	29.5	230
131	48.6	46.7	44.7	42.7	40.7	38 8	36.9	35.0	33.1	31 2	29.4	229
132	48.6	46.6	44.6	42.6	40.6	38.6	36.7	34.8	32.9	31.0	29.2	228
133	48.6	46.5	44.5	42.5	40.5	38.5	36.5	34.6	32.7	30.8	29.0	227
134	48.5	46.4	44.3	42.3	40.3	38.3	36.3	34.4	32.5	30.6	28.7	226
135	48 4	46.3	44.2	42.1	40.1	38.1	36.1	34.2	32.3	30.4	28.5	225
s_h	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	$_h s$

a h	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	h a
°	°	°	°	°	°	°	°	°	°	°	°	°
90	+40.2	+40.7	+41.2	+41.7	+42.1	+42.6	+43.0	+43.4	+43.8	+44.2	+44.5	270
91	+40.7	+41.1	+41.6	+42.1	+42.5	+43.0	+43.4	+43.8	+44.1	+44.5	+44.8	269
92	+41.1	+41.6	+42.0	+42.5	+42.9	+43.3	+43.7	+44.1	+44.4	+44.8	+45.1	268
93	+41.5	+42.0	+42.4	+42.9	+43.3	+43.7	+44.1	+44.5	+44.8	+45.1	+45.4	267
94	+42.0	+42.5	+42.9	+43.3	+43.7	+44.1	+44.4	+44.8	+45.1	+45.4	+45.7	266
95	+42.4	+42.9	+43.3	+43.7	+44.1	+44.5	+44.8	+45.2	+45.5	+45.8	+46.1	265
96	+42.9	+43.3	+43.7	+44.1	+44.5	+44.9	+45.2	+45.5	+45.8	+46.1	+46.4	264
97	+43.4	+43.8	+44.1	+44.6	+44.9	+45.3	+45.6	+45.9	+46.2	+46.5	+46.7	263
98	+43.8	+44.2	+44.6	+45.0	+45.3	+45.6	+45.9	+46.2	+46.5	+46.8	+47.0	262
99	+44.3	+44.7	+45.0	+45.5	+45.8	+46.1	+46.3	+46.6	+46.9	+47.2	+47.4	261
100	+44.8	+45.2	+45.5	+45.9	+46.2	+46.5	+46.7	+47.0	+47.3	+47.5	+47.7	260
101	+45.3	+45.6	+45.9	+46.3	+46.6	+46.9	+47.1	+47.4	+47.7	+47.9	+48.1	259
102	+45.7	+46.1	+46.4	+46.7	+47.0	+47.3	+47.5	+47.8	+48.0	+48.2	+48.4	258
103	+46.2	+46.5	+46.8	+47.1	+47.4	+47.7	+47.9	+48.2	+48.4	+48.6	+48.8	257
104	+46.6	+46.9	+47.2	+47.5	+47.8	+48.1	+48.3	+48.5	+48.7	+48.9	+49.1	256
105	+47.0	+47.3	+47.6	+48.0	+48.2	+48.5	+48.7	+48.9	+49.1	+49.3	+49.4	255
106	+47.5	+47.8	+48.1	+48.4	+48.6	+48.9	+49.1	+49.3	+49.4	+49.6	+49.7	254
107	+48.0	+48.3	+48.6	+48.9	+49.1	+49.3	+49.5	+49.7	+49.8	+50.0	+50.1	253
108	+48.5	+48.8	+49.0	+49.3	+49.5	+59.7	+49.9	+50.1	+50.2	+50.3	+50.4	252
109	+48.9	+49.2	+49.4	+49.7	+49.9	+50.1	+50.3	+50.5	+50.6	+50.7	+50.8	251
110	+49.4	+49.7	+49.9	+50.1	+50.3	+50.5	+50.7	+50.8	+50.9	+51.0	+51.1	250
111	+49.9	+50.1	+50.4	+50.6	+50.8	+51.0	+51.1	+51.2	+51.3	+51.4	+51.5	249
112	+50.4	+50.6	+50.8	+51.0	+51.2	+51.4	+51.5	+51.6	+51.7	+51.8	+51.8	248
113	+50.9	+51.1	+51.2	+51.5	+51.6	+51.8	+51.9	+52.0	+52.1	+52.2	+52.2	247
114	+51.3	+51.5	+51.7	+51.9	+52.0	+52.1	+52.2	+52.3	+52.4	+52.5	+52.5	246
115	+51.8	+52.0	+52.2	+52.4	+52.5	+52.6	+52.7	+62.8	+52.8	+52.9	+52.9	245
116	+52.3	+52.5	+52.6	+52.8	+52.9	+53.0	+53.1	+53.2	+53.2	+53.2	+53.2	244
117	+52.8	+53.0	+53.1	+53.3	+53.4	+53.4	+53.5	+53.6	+53.6	+53.6	+53.5	243
118	+53.3	+53.5	+53.6	+53.7	+53.8	+53.8	+53.9	+53.9	+53.9	+53.9	+53.8	242
119	+53.8	+53.9	+54.0	+54.1	+54.2	+54.3	+54.3	+54.3	+54.3	+54.3	+54.2	241
120	+54.3	+54.4	+54.5	+54.6	+54.7	+54.7	+54.7	+54.7	+54.7	+54.6	+54.5	240
121	+54.8	+54.9	+55.0	+55.0	+55.1	+55.1	+55.1	+55.1	+55.	+55.0	+54.9	239
122	+55.3	+55.4	+55.5	+55.6	+55.6	+55.6	+55.5	+55.5	+55.4	+55.3	+55.2	238
123	+55.8	+55.9	+56.0	+56.0	+56.0	+56.0	+55.9	+55.9	+55.8	+55.7	+55.6	237
124	+56.3	+56.4	+56.5	+56.5	+56.5	+56.5	+56.4	+56.3	+56.2	+56.1	+55.9	236
125	+56.8	+56.9	+56.9	+56.9	+56.9	+56.9	+56.8	+56.7	+56.6	+56.5	+56.3	235
126	+57.3	+57.3	+57.3	+57.3	+57.3	+57.3	+57.2	+57.1	+57.0	+56.8	+56.6	234
127	+57.8	+57.8	+57.8	+57.8	+57.8	+57.7	+57.6	+57.5	+57.4	+57.2	+57.0	233
128	+58.3	+58.3	+58.3	+58.3	+58.2	+58.1	+58.0	+57.9	+57.7	+57.5	+57.3	232
129	+58.8	+58.8	+58.8	+58.7	+58.6	+58.5	+58.4	+58.2	+58.0	+57.8	+57.6	231
130	+59.3	+59.3	+59.2	+59.2	+59.1	+59.0	+58.8	+58.6	+58.4	+58.2	+57.9	230
131	+59.8	+59.8	+59.7	+59.6	+59.5	+59.3	+59.1	+58.9	+58.8	+58.5	+58.2	229
132	+60.3	+60.3	+60.2	+60.1	+59.9	+59.7	+59.5	+59.3	+59.1	+58.8	+58.5	228
133	+60.8	+60.8	+60.7	+60.6	+60.4	+60.2	+59.9	+59.7	+59.5	+59.2	+58.9	227
134	+61.3	+61.2	+61.1	+61.0	+60.8	+60.6	+60.3	+60.1	+59.8	+59.5	+59.2	226
135	+61.8	+61.7	+61.6	+61.5	+61.3	+61.0	+60.7	+60.5	+60.2	+59.9	+59.5	225
a h	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	h a

a h	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	h a
°	°	°	°	°	°	°	°	°	°	°	°	°
90	28.6	27.3	26.0	24.7	23.3	21.9	20.5	19.1	17.7	16.3	14.8	270
91	28.8	27.5	26.2	24.8	23.4	22.0	20.6	19.2	17.8	16.4	14.9	269
92	29.0	27.7	26.3	24.9	23.5	22.1	20.7	19.3	17.8	16.4	14.9	268
93	29.2	27.8	26.4	25.0	23.6	22.2	20.8	19.4	17.9	16.5	15.0	267
94	29.3	27.9	26.5	25.1	23.7	22.3	20.8	19.4	17.9	16.5	15.0	266
95	29.4	28.0	26.6	25.2	23.8	22.4	20.9	19.5	18.0	16.5	15.0	265
96	29.5	28.1	26.7	25.3	23.9	22.5	21.0	19.5	18.0	16.5	15.0	264
97	29.7	28.3	26.8	25.4	24.0	22.6	21.1	19.6	18.1	16.6	15.1	263
98	29.8	28.4	26.9	25.5	24.0	22.6	21.1	19.6	18.1	16.6	15.1	262
99	29.9	28.5	27.0	25.6	24.1	22.7	21.2	19.7	18.2	16.6	15.1	261
100	30.0	28.6	27.1	25.7	24.2	22.7	21.2	19.7	18.2	16.6	15.1	260
101	30.1	28.7	27.2	25.7	24.3	22.8	21.2	19.7	18.2	16.7	15.1	259
102	30.2	28.8	27.3	25.8	24.3	22.8	21.2	19.7	18.2	16.7	15.1	258
103	30.3	28.9	27.4	25.9	24.4	22.9	21.3	19.8	18.2	16.7	15.1	257
104	30.4	28.9	27.4	25.9	24.4	22.9	21.3	19.8	18.2	16.7	15.1	256
105	30.5	29.0	27.5	26.0	24.5	23.0	21.4	19.8	18.2	16.7	15.1	255
106	30.6	29.1	27.5	26.0	24.5	23.0	21.4	19.8	18.2	16.6	15.0	254
107	30.7	29.2	27.6	26.1	24.5	22.9	21.4	19.8	18.2	16.6	15.0	253
108	30.7	29.2	27.6	26.1	24.5	22.9	21.3	19.7	18.2	16.6	15.0	252
109	30.8	29.2	27.6	26.1	24.5	22.9	21.3	19.7	18.2	16.6	15.0	251
110	30.8	29.2	27.6	26.0	24.4	22.8	21.2	19.6	18.1	16.5	14.9	250
111	30.8	29.2	27.6	26.0	24.4	22.8	21.2	19.6	18.1	16.5	14.9	249
112	30.8	29.2	27.6	26.0	24.4	22.8	21.2	19.6	18.0	16.4	14.8	248
113	30.8	29.2	27.6	26.0	24.4	22.8	21.2	19.6	18.0	16.4	14.8	247
114	30.8	29.1	27.5	25.9	24.3	22.7	21.1	19.5	17.9	16.3	14.7	246
115	30.8	29.1	27.5	25.9	24.3	22.7	21.1	19.5	17.9	16.3	14.7	245
116	30.8	29.1	27.5	25.8	24.2	22.6	21.0	19.4	17.8	16.2	14.6	244
117	30.8	29.1	27.5	25.8	24.2	22.5	20.9	19.3	17.7	16.1	14.6	243
118	30.8	29.1	27.4	25.7	24.1	22.4	20.8	19.2	17.6	16.0	14.5	242
119	30.8	29.1	27.4	25.7	24.0	22.3	20.7	19.1	17.5	15.9	14.4	241
120	30.7	29.0	27.3	25.6	23.9	22.2	20.6	19.0	17.4	15.8	14.3	240
121	30.7	28.9	27.2	25.5	23.8	22.1	20.5	18.9	17.3	15.7	14.2	239
122	30.6	28.8	27.1	25.4	23.7	22.0	20.4	18.8	17.2	15.6	14.1	238
123	30.5	28.7	27.0	25.3	23.6	21.9	20.3	18.7	17.1	15.5	14.0	237
124	30.4	28.6	26.9	25.2	23.5	21.8	20.2	18.6	17.0	15.4	13.9	236
125	30.3	28.5	26.8	25.1	23.4	21.7	20.1	18.5	16.9	15.3	13.8	235
126	30.1	28.3	26.6	24.9	23.2	21.5	19.9	18.3	16.8	15.2	13.7	234
127	30.0	28.2	26.5	24.8	23.1	21.4	19.8	18.2	16.7	15.1	13.6	233
128	29.8	28.0	26.3	24.6	22.9	21.2	19.6	18.0	16.5	14.9	13.4	232
129	29.7	27.9	26.2	24.5	22.8	21.1	19.5	17.9	16.4	14.8	13.3	231
130	29.5	27.7	26.0	24.3	22.6	20.9	19.3	17.7	16.2	14.6	13.1	230
131	29.4	27.6	25.8	24.1	22.4	20.7	19.1	17.5	16.0	14.5	13.0	229
132	29.2	27.4	25.6	23.9	22.2	20.5	18.9	17.3	15.8	14.3	12.8	228
133	29.0	27.2	25.4	23.7	22.0	20.3	18.7	17.1	15.6	14.1	12.7	227
134	28.7	26.9	25.1	23.4	21.7	20.1	18.5	16.9	15.4	13.9	12.5	226
135	28.5	26.7	24.9	23.2	21.5	19.9	18.3	16.7	15.2	13.7	12.3	225
a h	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	h a

a h	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	h a
°	°	°	°	°	°	°	°	°	°	°	°	°
90	+44.5	+44.9	+45.2	+45.5	+45.8	+46.1	+46.3	+46.6	+46.8	+47.0	+47.2	270
91	+44.8	+45.2	+45.5	+45.8	+46.1	+46.4	+46.6	+46.8	+47.0	+47.2	+47.4	269
92	+45.1	+45.4	+45.7	+46.0	+46.3	+46.6	+46.8	+47.0	+47.2	+47.4	+47.6	268
93	+45.4	+45.7	+46.0	+46.3	+46.6	+46.9	+47.1	+47.3	+47.5	+47.7	+47.8	267
94	+45.7	+46.0	+46.3	+46.6	+46.8	+47.1	+47.3	+47.5	+47.7	+47.9	+48.0	266
95	+46.1	+46.4	+46.6	+46.9	+47.1	+47.4	+47.6	+47.8	+47.9	+48.1	+48.2	265
66	+46.4	+46.7	+46.9	+47.2	+47.4	+47.6	+47.8	+48.0	+48.1	+48.2	+48.3	264
97	+46.7	+47.0	+47.2	+47.5	+47.7	+47.9	+48.1	+48.2	+48.3	+48.4	+48.5	263
98	+47.0	+47.3	+47.5	+47.7	+47.9	+48.1	+48.3	+48.4	+48.5	+48.6	+48.7	262
99	+47.4	+47.6	+47.8	+48.0	+48.2	+48.4	+48.5	+48.6	+48.7	+48.8	+48.9	261
100	+47.7	+47.9	+48.1	+48.3	+48.4	+48.6	+48.7	+48.8	+48.9	+49.0	+49.0	260
101	+48.1	+48.3	+48.5	+48.6	+48.7	+48.9	+49.0	+49.1	+49.1	+49.2	+49.2	259
102	+48.4	+48.6	+48.8	+48.9	+49.0	+49.1	+49.2	+49.3	+49.3	+49.3	+49.3	258
103	-48.8	+49.0	+49.1	+49.2	+49.3	+49.4	+49.5	+49.5	+49.5	+49.5	+49.5	257
104	+49.1	+49.3	+49.4	+49.5	+49.6	+49.7	+49.7	+49.7	+49.7	+49.7	+49.7	256
105	+49.4	+49.6	+49.7	+49.8	+49.9	+50.0	+50.0	+50.0	+49.9	+49.9	+49.9	255
106	+49.7	+49.9	+50.0	+50.1	+50.1	+50.2	+50.2	+50.2	+50.1	+50.1	+50.0	254
107	+50.1	+50.2	+50.3	+50.4	+50.4	+50.4	+50.4	+50.4	+50.3	+50.3	+50.2	253
108	+50.4	+50.5	+50.6	+50.6	+50.6	+50.6	+50.6	+50.6	+50.5	+50.5	+50.4	252
109	+50.8	+50.9	+50.9	+50.9	+50.9	+50.9	+50.9	+50.8	+50.7	+50.7	+50.6	251
110	+51.1	+51.2	+51.2	+51.2	+51.2	+51.2	+51.1	+51.0	+50.9	+50.8	+50.7	250
111	+51.5	+51.5	+51.5	+51.5	+51.5	+51.5	+51.4	+51.3	+51.1	+51.0	+50.9	249
112	+51.8	+51.8	+51.8	+51.8	+51.7	+51.7	+51.6	+51.5	+51.3	+51.2	+51.0	248
113	+52.2	+52.2	+52.2	+52.1	+52.0	+52.0	+51.9	+51.8	+51.6	+51.4	+51.2	247
114	+52.5	+52.5	+52.5	+52.4	+52.3	+52.2	+52.1	+52.0	+51.8	+51.6	+51.4	246
115	+52.9	+52.9	+52.8	+52.7	+52.6	+52.5	+52.4	+52.2	+52.0	+51.8	+51.6	245
116	+53.2	+53.2	+53.1	+53.0	+52.9	+52.8	+52.6	+52.4	+52.2	+52.0	+51.7	244
117	+53.5	+53.5	+53.4	+53.3	+53.2	+53.1	+52.9	+52.7	+52.4	+52.2	+51.9	243
118	+53.8	+53.8	+53.7	+53.6	+53.4	+53.3	+53.1	+52.9	+52.6	+52.4	+52.1	242
119	+54.2	+54.1	+54.0	+53.9	+53.7	+53.5	+53.3	+53.1	+52.8	+52.6	+52.3	241
120	+54.5	+54.4	+54.3	+54.1	+53.9	+53.7	+53.5	+53.3	+53.0	+52.7	+52.4	240
121	+54.9	+54.8	+54.6	+54.4	+54.2	+54.0	+53.8	+53.5	+53.2	+52.9	+52.6	239
122	+55.2	+55.1	+54.9	+54.7	+54.5	+54.3	+54.0	+53.7	+53.4	+53.1	+52.7	238
123	+55.6	+55.4	+55.2	+55.0	+54.8	+54.5	+54.2	+53.9	+53.6	+53.3	+52.9	237
124	+55.9	+55.7	+55.5	+55.3	+55.0	+54.7	+54.4	+54.1	+53.7	+53.4	+53.0	236
125	+56.3	+56.1	+55.8	+55.6	+55.3	+55.0	+54.7	+54.4	+54.0	+53.6	+53.2	235
126	+56.6	+56.4	+56.1	+55.8	+55.5	+55.2	+54.9	+54.6	+54.2	+53.8	+53.4	234
127	+57.0	+56.8	+56.4	+56.1	+55.8	+55.5	+55.1	+54.8	+54.4	+54.0	+53.6	233
128	+57.3	+57.0	+56.7	+56.4	+56.0	+55.7	+55.3	+55.0	+54.5	+54.1	+53.7	232
129	+57.6	+57.3	+57.0	+56.7	+56.3	+56.0	+55.6	+55.2	+54.7	+54.3	+53.9	23
130	+57.9	+57.6	+57.3	+57.0	+56.6	+56.2	+55.8	+55.4	+54.9	+54.5	+54.0	230
131	+58.2	+57.9	+57.6	+57.3	+56.9	+56.5	+56.0	+55.6	+55.1	+54.7	+54.2	229
132	+58.5	+58.2	+57.9	+57.5	+57.1	+56.7	+56.2	+55.8	+55.3	+54.8	+54.3	228
133	+58.9	+58.6	+58.2	+57.8	+57.4	+57.0	+56.5	+56.0	+55.5	+55.0	+54.5	227
134	+59.2	+58.9	+58.5	+58.1	+57.6	+57.2	+56.7	+56.2	+55.7	+55.2	+54.6	226
135	+59.5	+59.2	+58.8	+58.3	+57.8	+57.4	+56.9	+56.4	+55.9	+55.3	+54.7	225
a h	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	h a

a^h	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	h_a
°	°	°	°	°	°	°	°	°	°	°	°	°
90	14.8	13.4	11.9	10.5	9.0	7.5	6.0	4.5	3.0	1.5	0.0	270
91	14.9	13.5	12.0	10.5	9.0	7.5	6.0	4.5	3.0	1.5	0.0	269
92	14.9	13.5	12.0	10.5	9.0	7.5	6.0	4.5	3.0	1.5	0.0	268
93	15.0	13.5	12.0	10.5	9.0	7.5	6.0	4.5	3.0	1.5	0.0	267
94	15.0	13.5	12.0	10.5	9.0	7.5	6.0	4.5	3.0	1.5	0.0	266
95	15.0	13.5	12.0	10.5	9.0	7.5	6.0	4.5	3.0	1.5	0.0	265
96	15.0	13.5	12.0	10.5	9.0	7.5	6.0	4.5	3.0	1.5	0.0	264
97	15.1	13.6	12.1	10.5	9.0	7.5	6.0	4.5	3.0	1.5	0.0	263
98	15.1	13.6	12.1	10.5	9.0	7.5	6.0	4.5	3.0	1.5	0.0	262
99	15.1	13.6	12.1	10.5	9.0	7.5	6.0	4.5	3.0	1.5	0.0	261
100	15.1	13.6	12.1	10.5	9.0	7.5	6.0	4.5	3.0	1.5	0.0	260
101	15.1	13.6	12.1	10.5	9.0	7.5	6.0	4.5	3.0	1.5	0.0	259
102	15.1	13.6	12.0	10.4	8.9	7.4	5.9	4.4	2.9	1.4	0.0	258
103	15.1	13.6	12.0	10.4	8.9	7.4	5.9	4.4	2.9	1.4	0.0	257
104	15.1	13.6	12.0	10.4	8.9	7.4	5.9	4.4	2.9	1.4	0.0	256
105	15.1	13.6	12.0	10.4	8.9	7.4	5.9	4.4	2.9	1.4	0.0	255
106	15.0	13.5	11.9	10.4	8.9	7.4	5.9	4.4	2.9	1.4	0.0	254
107	15.0	13.5	11.9	10.4	8.9	7.4	5.9	4.4	2.9	1.4	0.0	253
108	15.0	13.5	11.9	10.3	8.8	7.3	5.8	4.3	2.9	1.4	0.0	252
109	15.0	13.5	11.9	10.3	8.8	7.3	5.8	4.3	2.8	1.4	0.0	251
110	14.9	13.4	11.8	10.3	8.8	7.3	5.8	4.3	2.8	1.4	0.0	250
111	14.9	13.4	11.8	10.3	8.8	7.3	5.8	4.3	2.8	1.4	0.0	249
112	14.8	13.3	11.7	10.2	8.7	7.2	5.7	4.2	2.8	1.4	0.0	248
113	14.8	13.3	11.7	10.2	8.7	7.2	5.7	4.2	2.8	1.4	0.0	247
114	14.7	13.2	11.6	10.1	8.6	7.1	5.7	4.2	2.8	1.4	0.0	246
115	14.7	13.2	11.6	10.1	8.6	7.1	5.7	4.2	2.8	1.4	0.0	245
116	14.6	13.1	11.5	10.0	8.5	7.0	5.6	4.1	2.7	1.3	0.0	244
117	14.6	13.1	11.5	10.0	8.5	7.0	5.6	4.1	2.7	1.3	0.0	243
118	14.5	13.0	11.4	9.9	8.4	6.9	5.5	4.1	2.7	1.3	0.0	242
119	14.4	12.9	11.4	9.9	8.4	6.9	5.5	4.1	2.7	1.3	0.0	241
120	14.3	12.8	11.3	9.8	8.3	6.9	5.5	4.1	2.7	1.3	0.0	240
121	14.2	12.7	11.2	9.7	8.3	6.9	5.5	4.1	2.7	1.3	0.0	239
122	14.1	12.6	11.1	9.6	8.2	6.8	5.4	4.0	2.6	1.3	0.0	238
123	14.0	12.5	11.0	9.5	8.1	6.7	5.4	4.0	2.6	1.3	0.0	237
124	13.9	12.4	10.9	9.4	8.0	6.6	5.3	3.9	2.6	1.3	0.0	236
125	13.8	12.3	10.8	9.3	7.9	6.5	5.2	3.9	2.6	1.3	0.0	235
126	13.7	12.2	10.7	9.2	7.8	6.4	5.1	3.8	2.5	1.2	0.0	234
127	13.6	12.1	10.6	9.1	7.7	6.4	5.1	3.8	2.5	1.2	0.0	233
128	13.4	11.9	10.4	9.0	7.6	6.3	5.0	3.7	2.4	1.2	0.0	232
129	13.3	11.8	10.3	8.9	7.5	6.2	4.9	3.6	2.4	1.2	0.0	231
130	13.1	11.7	10.2	8.8	7.4	6.1	4.8	3.6	2.4	1.2	0.0	230
131	13.0	11.6	10.1	8.7	7.3	6.0	4.8	3.6	2.4	1.2	0.0	229
132	12.8	11.4	9.9	8.5	7.2	5.9	4.7	3.5	2.3	1.1	0.0	228
133	12.7	11.3	9.8	8.4	7.1	5.8	4.6	3.4	2.3	1.1	0.0	227
134	12.5	11.1	9.7	8.3	7.0	5.7	4.5	3.3	2.2	1.1	0.0	226
135	12.3	11.0	9.6	8.2	6.9	5.7	4.5	3.3	2.2	1.1	0.0	225
$^a{}_h$	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	$_h{}^a$

a \ h	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
90	+47.2	+47.4	+47.5	+47.7	+47.8	+47.9	+48.0	+48.1	+48.2	+48.2	+48.2	270
91	+47.4	+47.6	+47.7	+47.9	+48.0	+48.1	+48.1	+48.2	+48.2	+48.2	+48.2	269
92	+47.6	+47.8	+47.9	+48.0	+48.1	+48.2	+48.2	+48.2	+48.2	+48.2	+48.2	268
93	+47.8	+48.0	+48.1	+48.2	+48.2	+48.3	+48.3	+48.3	+48.3	+48.3	+48.2	267
94	+48.0	+48.1	+48.2	+48.3	+48.3	+48.3	+48.3	+48.3	+48.3	+48.3	+48.2	266
95	+48.2	+48.3	+48.3	+48.4	+48.4	+48.4	+48.4	+48.4	+48.4	+48.3	+48.2	265
96	+48.3	+48.4	+48.4	+48.5	+48.5	+48.5	+48.5	+48.5	+48.4	+48.3	+48.2	264
97	+48.5	+48.6	+48.6	+48.6	+48.6	+48.6	+48.6	+48.6	+48.5	+48.4	+48.2	263
98	+48.7	+48.7	+48.7	+48.7	+48.7	+48.7	+48.6	+48.6	+48.5	+48.4	+48.2	262
99	+48.9	+48.9	+48.9	+48.9	+48.8	+48.8	+48.7	+48.6	+48.5	+48.4	+48.2	261
100	+49.0	+49.0	+49.0	+49.0	+48.9	+48.8	+48.7	+48.6	+48.5	+48.4	+48.2	260
101	+49.2	+49.2	+49.1	+49.1	+49.0	+48.9	+48.8	+48.7	+48.6	+48.4	+48.2	259
102	+49.3	+49.3	+49.2	+49.2	+49.1	+49.0	+48.9	+48.8	+48.6	+48.4	+48.2	258
103	+49.5	+49.5	+49.4	+49.3	+49.2	+49.1	+49.0	+48.9	+48.7	+48.5	+48.2	257
104	-49.7	+49.6	+49.5	+49.4	+49.3	+49.2	+49.0	+48.9	+48.7	+48.5	+48.2	256
105	+49.9	+49.8	+49.7	+49.6	+49.4	+49.3	+49.1	+49.0	+48.8	+48.5	+48.2	255
106	+50.0	+49.9	+49.8	+49.7	+49.5	+49.4	+49.2	+49.0	+48.8	+48.5	+48.2	254
107	+50.2	+50.1	+50.0	+49.8	+49.6	+49.5	+49.3	+49.1	+48.8	+48.5	+48.2	253
108	+50.4	+50.3	+50.1	+49.9	+49.7	+49.5	+49.3	+49.1	+48.8	+48.5	+48.2	252
109	+50.6	+50.4	+50.2	+50.0	+49.8	+49.6	+49.4	+49.2	+48.9	+48.6	+48.2	251
110	+50.7	+50.5	+50.3	+50.1	+49.9	+49.7	+49.4	+49.2	+48.9	+48.6	+48.2	250
111	+50.9	+50.7	+50.5	+50.3	+50.0	+49.8	+49.5	+49.2	+48.9	+48.6	+48.2	249
112	+51.0	+50.8	+50.6	+50.4	+50.1	+49.8	+49.5	+49.2	+48.9	+48.6	+48.2	248
113	+51.2	+51.0	+50.8	+50.5	+50.2	+49.9	+49.6	+49.3	+49.0	+48.6	+48.2	247
114	+51.4	+51.2	+50.9	+50.6	+50.3	+50.0	+49.7	+49.4	+49.0	+48.6	+48.2	246
115	+51.6	+51.3	+51.0	+50.7	+50.4	+50.1	+49.8	+49.5	+49.1	+48.7	+48.2	245
116	-51.7	+51.4	+51.1	+50.8	+50.5	+50.2	+49.8	+49.5	+49.1	+48.7	+48.2	244
117	+51.9	+51.6	+51.3	+51.0	+50.6	+50.3	+49.9	+49.6	+49.2	+48.7	+48.2	243
118	+52.1	+51.8	+51.4	+51.1	+50.7	+50.4	+50.0	+49.6	+49.2	+48.7	+48.2	242
119	+52.3	+52.0	+51.6	+51.2	+50.8	+50.5	+50.1	+49.7	+49.2	+48.7	+48.2	241
120	-52.4	+52.1	+51.7	+51.3	+50.9	+50.5	+50.1	+49.7	+49.2	+48.7	+48.2	240
121	+52.6	+52.2	+51.8	+51.4	+51.0	+50.6	+50.2	+49.8	+49.3	+48.8	+48.2	239
122	+52.7	+52.3	+51.9	+51.5	+51.1	+50.7	+50.2	+49.8	+49.3	+48.8	+48.2	238
123	+52.9	+52.5	+52.1	+51.7	+51.2	+50.8	+50.3	+49.8	+49.3	+48.8	+48.2	237
124	+53.0	+52.6	+52.2	+51.8	+51.3	+50.8	+50.3	+49.8	+49.3	+48.8	+48.2	236
125	+53.2	+52.8	+52.4	+51.9	+51.4	+50.9	+50.4	+49.9	+49.4	+48.8	+48.2	235
126	+53.4	+53.0	+52.5	+52.0	+51.5	+51.0	+50.5	+50.0	+49.4	+48.8	+48.2	234
127	+53.6	+53.1	+52.6	+52.1	+51.6	+51.1	+50.6	+50.0	+49.4	+48.8	+48.2	233
128	+53.7	+53.2	+52.7	+52.2	+51.7	+51.2	+50.6	+50.0	+49.4	+48.8	+48.2	232
129	+53.9	+53.4	+52.9	+52.4	+51.8	+51.3	+50.7	+50.1	+49.5	+48.9	+48.2	231
130	+54.0	+53.5	+53.0	+52.5	+51.9	+51.3	+50.7	+50.1	+49.5	+48.9	+48.2	230
131	+54.2	+53.7	+53.1	+52.6	+52.0	+51.4	+50.8	+50.2	+49.5	+48.9	+48.2	229
132	+54.3	+53.8	+53.2	+52.6	+52.0	+51.4	+50.8	+50.2	+49.5	+48.9	+48.2	228
133	+54.5	+53.9	+53.3	+52.7	+52.1	+51.5	+50.9	+50.3	+49.6	+48.9	+48.2	227
134	+54.6	+54.0	+53.4	+52.8	+52.2	+51.6	+50.9	+50.3	+49.6	+48.9	+48.2	226
135	+54.7	+54.1	+53.5	+52.9	+52.3	+51.7	+51.0	+50.3	+49.6	+48.9	+48.2	225
a \ h	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	h \ a

a \ h	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
135	126.7	126.1	125.5	124.9	124.2	123.6	122.9	122.2	121.5	120.8	120.1	225
136	127.7	127.1	126.5	125.9	125.2	124.6	123.9	123.2	122.5	121.8	121.1	224
137	128.6	128.0	127.4	126.8	126.2	125.6	124.9	124.2	123.5	122.8	122.1	223
138	129.6	129.0	128.4	127.8	127.2	126.6	125.9	125.2	124.5	123.8	123.1	222
139	130.6	130.0	129.4	128.8	128.2	127.6	126.9	126.2	125.5	124.8	124.1	221
140	131.6	131.0	130.4	129.8	129.2	128.6	127.9	127.3	126.6	125.9	125.2	220
141	132.6	132.0	131.4	130.8	130.2	129.6	128.9	128.3	127.6	126.9	126.2	219
142	133.6	133.1	132.5	131.9	131.3	130.7	130.0	129.4	128.7	128.0	127.3	218
143	134.6	134.1	133.5	133.0	132.4	131.8	131.1	130.5	129.8	129.1	128.4	217
144	135.7	135.2	134.6	134.1	133.5	132.9	132.2	131.6	130.9	130.2	129.5	216
145	136.7	136.2	135.7	135.2	134.6	134.0	133.3	132.7	132.0	131.3	130.6	215
146	137.8	137.3	136.8	136.3	135.7	135.1	134.5	133.9	133.2	132.5	131.8	214
147	138.9	138.4	137.9	137.4	136.8	136.2	135.6	135.0	134.3	133.7	133.0	213
148	140.0	139.5	139.0	138.5	137.9	137.3	136.7	136.1	135.5	134.9	134.2	212
149	141.1	140.6	140.1	139.6	139.0	138.4	137.8	137.3	136.7	136.1	135.4	211
150	142.2	141.7	141.2	140.7	140.1	139.6	139.0	138.5	137.9	137.3	136.6	210
151	143.3	142.8	142.3	141.8	141.2	140.7	140.2	139.7	139.1	138.5	137.8	209
152	144.5	144.0	143.5	143.0	142.4	141.9	141.4	140.9	140.3	139.7	139.1	208
153	145.6	145.1	144.6	144.1	143.6	143.1	142.6	142.1	141.5	140.9	140.3	207
154	146.8	146.3	145.8	145.3	144.8	144.3	143.8	143.3	142.8	142.2	141.6	206
155	148.0	147.5	147.0	146.5	146.0	145.5	145.0	144.5	144.0	143.5	142.9	205
156	149.2	148.8	148.3	147.8	147.3	146.8	146.3	145.8	145.3	144.8	144.2	204
157	150.4	150.0	149.5	149.0	148.5	148.1	147.6	147.1	146.6	146.1	145.5	203
158	151.6	151.2	150.7	150.3	149.8	149.4	148.9	148.5	147.9	147.4	146.9	202
159	152.8	152.4	151.9	151.5	151.1	150.7	150.2	149.7	149.2	148.7	148.2	201
160	154.0	153.6	153.2	152.8	152.4	152.0	151.5	151.1	150.6	150.1	149.6	200
161	155.2	154.9	154.5	154.1	153.7	153.3	152.8	152.4	151.9	151.5	151.0	199
162	156.5	156.2	155.8	155.4	155.0	154.6	154.2	153.8	153.3	152.9	152.4	198
163	157.7	157.4	157.1	156.7	156.3	155.9	155.5	155.1	154.7	154.3	153.8	197
164	159.0	158.7	158.4	158.1	157.7	157.3	156.9	156.5	156.1	155.7	155.3	196
165	160.2	160.0	159.7	159.4	159.0	158.7	158.3	157.9	157.5	157.1	156.7	195
166	161.5	161.3	161.0	160.7	160.4	160.1	159.7	159.4	159.0	158.6	158.2	194
167	162.8	162.6	162.3	162.0	161.7	161.4	161.1	160.8	160.4	160.1	159.7	193
168	164.1	163.9	163.6	163.4	163.1	162.8	162.5	162.2	161.9	161.6	161.2	192
169	165.4	165.2	164.9	164.7	164.4	164.2	163.9	163.6	163.3	163.0	162.7	191
170	166.7	166.5	166.3	166.1	165.8	165.6	165.3	165.1	164.8	164.6	164.3	190
171	168.0	167.8	167.6	167.4	167.2	167.0	166.7	166.5	166.3	166.1	165.8	189
172	169.3	169.2	169.0	168.8	168.6	168.4	168.2	168.0	167.8	167.0	167.4	188
173	170.6	170.5	170.3	170.2	170.0	169.8	169.6	169.5	169.3	169.1	168.9	187
174	171.9	171.8	171.7	171.6	171.4	171.3	171.1	171.0	170.8	170.7	170.5	186
175	173.2	173.2	173.1	173.0	172.8	172.7	172.6	172.5	172.3	172.2	172.1	185
176	174.6	174.6	174.5	174.4	174.3	174.2	174.1	174.0	173.9	173.8	173.8	184
177	175.9	175.9	175.8	175.8	175.7	175.6	175.5	175.5	175.4	175.3	175.3	183
178	177.3	177.3	177.2	177.2	177.1	177.1	177.0	177.0	176.9	176.9	176.9	182
179	178.6	178.6	178.6	178.6	178.5	178.5	178.5	178.5	178.4	178.4	178.4	181
180	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180
a \ h	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	h \ a

h / a	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
135	+28.1	+29.0	+29.8	+30.7	+31.5	+32.4	+33.2	+34.0	+34.8	+35.6	+36.4	225
136	+28.6	+29.5	+30.3	+31.2	+32.0	+32.9	+33.7	+34.5	+35.3	+36.2	+37.0	224
137	+29.2	+30.1	+30.9	+31.8	+32.6	+33.5	+34.3	+35.1	+35.9	+36.8	+37.6	223
138	+29.7	+30.6	+31.4	+32.3	+33.1	+34.0	+34.8	+35.6	+36.4	+37.3	+38.1	222
139	+30.2	+31.1	+31.9	+32.8	+33.6	+34.5	+35.3	+36.2	+37.0	+37.9	+38.7	221
140	+30.7	+31.6	+32.4	+33.3	+34.1	+35.0	+35.8	+36.7	+37.5	+38.4	+39.2	220
141	+31.2	+32.1	+32.9	+33.8	+34.6	+35.5	+36.4	+37.3	+38.1	+39.0	+39.8	219
142	+31.7	+32.6	+33.4	+34.3	+35.1	+36.0	+36.9	+37.8	+38.6	+39.5	+40.3	218
143	+32.2	+33.1	+33.9	+34.8	+35.6	+36.5	+37.4	+38.3	+39.1	+40.0	+40.8	217
144	+32.6	+33.5	+34.4	+35.3	+36.1	+37.0	+37.9	+38.8	+39.6	+40.5	+41.3	216
145	+33.1	+34.0	+34.9	+35.8	+36.6	+37.5	+38.4	+39.3	+40.1	+41.0	+41.9	215
146	+33.5	+34.4	+35.3	+36.2	+37.1	+38.0	+38.9	+39.8	+40.6	+41.5	+42.4	214
147	+34.0	+34.9	+35.8	+36.7	+37.6	+38.5	+39.4	+40.3	+41.1	+42.0	+42.9	213
148	+34.4	+35.3	+36.2	+37.1	+38.0	+38.9	+39.8	+40.7	+41.6	+42.5	+43.4	212
149	+34.8	+35.8	+36.7	+37.6	+38.5	+39.4	+40.3	+41.2	+42.1	+43.0	+43.9	211
150	+35.2	+36.2	+37.1	+38.0	+38.9	+39.8	+40.7	+41.6	+42.5	+43.4	+44.3	210
151	+35.6	+36.6	+37.5	+38.4	+39.3	+40.2	+41.1	+42.0	+42.9	+43.8	+44.7	209
152	+36.0	+37.0	+37.9	+38.8	+39.7	+40.6	+41.5	+42.4	+43.3	+44.2	+45.1	208
153	+36.4	+37.4	+38.3	+39.2	+40.1	+41.0	+41.9	+42.8	+43.7	+44.7	+45.6	207
154	+36.8	+37.8	+38.7	+39.6	+40.5	+41.4	+42.3	+43.2	+44.1	+45.1	+46.0	206
155	+37.2	+38.2	+39.1	+40.0	+40.9	+41.8	+42.7	+43.6	+44.5	+45.5	+46.4	205
156	+37.5	+38.5	+39.4	+40.3	+41.2	+42.2	+43.1	+44.0	+44.9	+45.9	+46.8	204
157	+37.9	+38.9	+39.8	+40.7	+41.6	+42.6	+43.5	+44.4	+45.3	+46.3	+47.2	203
158	+38.2	+39.2	+40.1	+41.0	+41.9	+42.9	+43.8	+44.8	+45.7	+46.7	+47.6	202
159	+38.5	+39.5	+40.4	+41.4	+42.3	+43.3	+44.2	+45.2	+46.1	+47.1	+48.0	201
160	+38.8	+39.8	+40.7	+41.7	+42.6	+43.6	+44.5	+45.5	+46.4	+47.4	+48.3	200
161	+39.1	+40.1	+41.0	+42.0	+42.9	+43.9	+44.8	+45.8	+46.7	+47.7	+48.6	199
162	+39.3	+40.3	+41.3	+42.3	+43.2	+44.2	+45.1	+46.1	+47.0	+48.0	+48.9	198
163	+39.6	+40.6	+41.6	+42.6	+43.5	+44.5	+45.4	+46.4	+47.3	+48.3	+49.2	197
164	+39.8	+40.8	+41.8	+42.8	+43.7	+44.7	+45.7	+46.7	+47.6	+48.6	+49.5	196
165	+40.1	+41.1	+42.1	+43.1	+44.0	+45.0	+46.0	+47.0	+47.9	+48.9	+49.8	195
166	+40.3	+41.3	+42.3	+43.3	+44.2	+45.2	+46.2	+47.2	+48.1	+49.1	+50.0	194
167	+40.5	+41.5	+42.5	+43.5	+44.4	+45.4	+46.4	+47.4	+48.3	+49.3	+50.3	193
168	+40.7	+41.7	+42.7	+43.7	+44.6	+45.6	+46.6	+47.6	+48.5	+49.5	+50.5	192
169	+40.9	+41.9	+42.9	+43.9	+44.8	+45.8	+46.8	+47.8	+48.7	+49.7	+50.7	191
170	+41.0	+42.0	+43.0	+44.0	+45.0	+46.0	+47.0	+48.0	+48.9	+49.9	+50.9	190
171	+41.2	+42.2	+43.2	+44.2	+45.2	+46.2	+47.2	+48.2	+49.1	+50.1	+51.1	189
172	+41.3	+42.3	+43.3	+44.3	+45.3	+46.3	+47.3	+48.3	+49.2	+50.2	+51.2	188
173	+41.4	+42.4	+43.4	+44.4	+45.4	+46.4	+47.4	+48.4	+49.3	+50.3	+51.3	187
174	+41.5	+42.5	+43.5	+44.5	+45.5	+46.5	+47.5	+48.5	+49.4	+50.4	+51.4	186
175	+41.6	+42.6	+43.6	+44.6	+45.6	+46.6	+47.6	+48.6	+49.5	+50.5	+51.5	185
176	+41.7	+42.7	+43.7	+44.7	+45.7	+46.7	+47.7	+48.7	+49.6	+50.6	+51.6	184
177	+41.8	+42.8	+43.8	+44.8	+45.8	+46.8	+47.8	+48.8	+49.7	+50.7	+51.7	183
178	+41.8	+42.8	+43.8	+44.8	+45.8	+46.8	+47.8	+48.8	+49.7	+50.7	+51.7	182
179	+41.8	+42.8	+43.8	+44.8	+45.8	+46.8	+47.8	+48.8	+49.8	+50.8	+51.8	181
180	+41.8	+42.8	+43.8	+44.8	+45.8	+46.8	+47.8	+48.8	+49.8	+50.8	+51.8	180
a / h	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	h / a

a h	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	h a
°	°	°	°	°	°	°	°	°	°	°	°	°
135	120.1	119.4	118.6	117.8	117.0	116.2	115.4	114.6	113.7	112.8	111.9	225
136	121.1	120.4	119.6	118.8	118.0	117.2	116.4	115.6	114.7	113.8	112.9	224
137	122.1	121.4	120.6	119.8	119.0	118.2	117.4	116.6	115.7	114.8	113.9	223
138	123.1	122.4	121.6	120.9	120.1	119.3	118.5	117.7	116.8	115.9	115.0	222
139	124.1	123.4	122.6	121.9	121.1	120.3	119.5	118.7	117.8	116.9	116.0	221
140	125.2	124.5	123.7	123.0	122.2	121.4	120.6	119.8	118.9	118.0	117.1	220
141	126.2	125.5	124.8	124.1	123.3	122.5	121.7	120.9	120.0	119.1	118.2	219
142	127.3	126.6	125.9	125.2	124.4	123.6	122.8	122.0	121.1	120.2	119.3	218
143	128.4	127.7	127.0	126.3	125.5	124.7	123.9	123.1	122.2	121.3	120.4	217
144	129.5	128.8	128.1	127.4	126.6	125.8	125.0	124.2	123.3	122.4	121.5	216
145	130.6	129.9	129.2	128.5	127.7	126.9	126.1	125.3	124.4	123.6	122.7	215
146	131.8	131.1	130.4	129.7	128.9	128.1	127.3	126.5	125.6	124.8	123.9	214
147	133.0	132.3	131.6	130.9	130.1	129.3	128.5	127.7	126.8	126.0	125.1	213
148	134.2	133.5	132.8	132.1	131.3	130.5	129.7	128.9	128.0	127.2	126.3	212
149	135.4	134.7	134.0	133.3	132.5	131.7	130.9	130.1	129.3	128.4	127.5	211
150	136.6	135.9	135.2	134.5	133.8	133.0	132.2	131.4	130.6	129.7	128.8	210
151	137.8	137.1	136.4	135.7	135.0	134.3	133.5	132.7	131.9	131.0	130.1	209
152	139.1	138.4	137.7	137.0	136.3	135.6	134.8	134.0	133.2	132.4	131.5	208
153	140.3	139.7	139.0	138.3	137.6	136.9	136.1	135.4	134.6	133.8	132.9	207
154	141.6	141.0	140.3	139.7	139.0	138.3	137.5	136.8	136.0	135.2	134.3	206
155	142.9	142.3	141.6	141.0	140.3	139.6	138.9	138.2	137.4	136.6	135.7	205
156	144.2	143.6	143.0	142.4	141.7	141.0	140.3	139.6	138.8	138.0	137.2	204
157	145.5	145.0	144.4	143.8	143.1	142.4	141.7	141.0	140.3	139.5	138.7	203
158	146.9	146.4	145.8	145.2	144.6	143.9	143.2	142.5	141.8	141.0	140.2	202
159	148.2	147.7	147.2	146.6	146.0	145.4	144.7	144.0	143.3	142.5	141.7	201
160	149.6	149.1	148.6	148.1	147.5	146.9	146.2	145.5	144.8	144.1	143.3	200
161	151.0	150.5	150.0	149.5	149.0	148.4	147.7	147.1	146.4	145.7	144.9	199
162	152.4	152.0	151.5	151.0	150.5	149.9	149.3	148.7	148.0	147.3	146.5	198
163	153.8	153.4	152.9	152.5	152.0	151.4	150.8	150.2	149.6	148.9	148.1	197
164	155.3	154.9	154.4	154.0	153.5	153.0	152.4	151.8	151.2	150.5	149.8	196
165	156.7	156.3	155.9	155.5	155.0	154.5	154.0	153.4	152.8	152.2	151.5	195
166	158.2	157.8	157.4	157.0	156.6	156.1	155.6	155.1	154.5	153.9	153.2	194
167	159.7	159.3	158.9	158.5	158.1	157.7	157.2	156.7	156.2	155.6	155.0	193
168	161.2	160.9	160.5	160.1	159.7	159.3	158.9	158.4	157.9	157.4	156.8	192
169	162.7	162.4	162.1	161.7	161.3	161.0	160.6	160.1	159.6	159.1	158.6	191
170	164.3	164.0	163.7	163.4	163.0	162.7	162.3	161.9	161.4	161.0	160.5	190
171	165.8	165.6	165.3	165.0	164.6	164.3	164.0	163.6	163.2	162.8	162.4	189
172	167.4	167.2	166.9	166.6	166.3	166.0	165.7	165.4	165.0	164.7	164.3	188
173	168.9	168.7	168.5	168.3	168.0	167.7	167.4	167.1	166.8	166.5	166.2	187
174	170.5	170.3	170.1	169.9	169.7	169.5	169.2	169.0	168.7	168.5	168.2	186
175	172.1	171.9	171.7	171.6	171.4	171.2	171.0	170.8	170.6	170.4	170.1	185
176	173.8	173.6	173.4	173.3	173.1	173.0	172.8	172.7	172.5	172.3	172.1	184
177	175.3	175.1	175.0	174.9	174.8	174.7	174.6	174.5	174.3	174.2	174.0	183
178	176.9	176.8	176.7	176.6	176.5	176.5	176.4	176.3	176.2	176.1	176.0	182
179	178.4	178.4	178.3	178.3	178.2	178.2	178.2	178.2	178.1	178.1	178.0	181
180	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180
a h	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	h a

a h	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	h a
°	°	°	°	°	°	°	°	°	°	°	°	°
135	+36.4	+37.2	+38.0	+38.8	+39.6	+40.4	+41.2	+42.0	+42.8	+43.6	+44.3	225
136	+37.0	+37.8	+38.6	+39.4	+40.2	+41.0	+41.8	+42.6	+43.4	+44.2	+44.9	224
137	+37.6	+38.4	+39.2	+40.0	+40.8	+41.6	+42.4	+43.2	+44.0	+44.8	+45.5	223
138	+38.1	+39.0	+39.8	+40.6	+41.4	+42.2	+43.0	+43.8	+44.6	+45.4	+46.1	222
139	+38.7	+39.6	+40.4	+41.2	+42.0	+42.8	+43.6	+44.4	+45.2	+46.0	+46.7	221
140	+39.2	+40.1	+40.9	+41.7	+42.5	+43.3	+44.1	+44.9	+45.7	+46 5	+47.3	220
141	+39.8	+40.7	+41.5	+42.3	+43.1	+43.9	+44.7	+45.5	+46.3	+47.1	+47.9	219
142	+40.3	+41.2	+42.0	+42.8	+43.6	+44.5	+45.3	+46.1	+46.9	+47.7	+48.5	218
143	+40.8	+41.7	+42.5	+43.4	+44.2	+45.1	+45.9	+46.7	+47.5	+48.3	+49.1	217
144	+41.3	+42.2	+43.0	+43.9	+44.7	+45.6	+46.4	+47.2	+48.0	+48.8	+49.6	216
145	+41.9	+42.8	+43.6	+44.5	+45.3	+46.2	+47.0	+47.8	+48.6	+49.4	+50.2	215
146	+42.4	+43.3	+44.1	+45.0	+45.8	+46.7	+47.5	+48.3	+49.1	+49.9	+50.7	214
147	+42.9	+43.8	+44.6	+45.5	+46.3	+47.2	+48.0	+48.9	+49.7	+50.5	+51.3	213
148	+43.4	+44.3	+45.1	+46.0	+46.8	+47.7	+48.5	+49.4	+50.2	+51.0	+51.8	212
149	+43.9	+44.8	+45.6	+46.5	+47.3	+48.2	+49.0	+49.9	+50.7	+51.6	+52.4	211
150	+44.3	+45.2	+46.0	+46.9	+47.8	+48.7	+49.5	+50.4	+51.2	+52.1	+52.9	210
151	+44.7	+45.6	+46.5	+47.4	+48.3	+49.2	+50.0	+50.9	+51.7	+52.6	+53.4	209
152	+45.1	+46.0	+46.9	+47.8	+48.7	+49.6	+50.5	+51.4	+52.2	+53.1	+53.9	208
153	+45.6	+46.5	+47.4	+48.3	+49.2	+50.1	+51.0	+51.9	+52.7	+53.6	+54.4	207
154	+46.0	+46.9	+47.8	+48.7	+49.6	+50.5	+51.4	+52.3	+53.2	+54.1	+54.9	206
155	+46.4	+47.3	+48.2	+49.2	+50.1	+51.0	+51.9	+52.8	+53.7	+54.6	+55.4	205
156	+46.8	+47.7	+48.6	+49.6	+50.5	+51.4	+52.3	+53.2	+54.1	+55.0	+55.8	204
157	+47.2	+48.1	+49.0	+50.0	+50.9	+51.8	+52.7	+53.6	+54.5	+55.4	+56.3	203
158	+47.6	+48.5	+49.4	+50.4	+51.3	+52.2	+53.1	+54.0	+54.9	+55.8	+56.7	202
159	+48.0	+48.9	+49.8	+50.8	+51.7	+52.6	+53.5	+54.4	+55.3	+56.2	+57.1	201
160	+48.3	+49.2	+50.1	+51.1	+52.0	+52.9	+53.8	+54.8	+55.7	+56 6	+57.5	200
161	+48.6	+49.6	+50.5	+51.5	+52.4	+53.3	+54.2	+55.2	+56.1	+57.0	+57.9	199
162	+48.9	+49.9	+50.8	+51.8	+52.7	+53.6	+54.5	+55.5	+56.4	+57.4	+58.3	198
163	+49.2	+50.2	+51.1	+52.1	+53.0	+54.0	+54.9	+55.9	+56.8	+57.8	+58.7	197
164	+49.5	+50.5	+51.4	+52.4	+53.3	+54.3	+55.2	+56.2	+57.1	+58 1	+59.0	196
165	+49.8	+50.8	+51.7	+52.7	+53.6	+54.6	+55.5	+56.5	+57.4	+58.4	+59.3	195
166	+50.0	+51.0	+51.9	+52.9	+53.9	+54.9	+55.8	+56.8	+57.7	+58.7	+59.6	194
167	+50.3	+51.3	+52.2	+53.2	+54.2	+55.2	+56.1	+57.1	+58.0	+59.0	+59.9	193
168	+50.5	+51.5	+52.4	+53.4	+54.4	+55.4	+56.3	+57.3	+58.2	+59.2	+60.2	192
169	+50.7	+51.7	+52.6	+53.6	+54.6	+55.6	+56.5	+57.5	+58.5	+59.5	+60.5	191
170	+50.9	+51.9	+52.8	+53.8	+54.8	+55.8	+56.7	+57.7	+58.7	+59.7	+60.7	190
171	+51.1	+52.1	+53.0	+54.0	+55.0	+56.0	+56.9	+57.9	+58.9	+59.9	+60.9	189
172	+51.2	+52.2	+53.2	+54.2	+55.2	+56.2	+57.1	+58.1	+59.1	+60.1	+61.1	188
173	+51.3	+52.3	+53.3	+54.3	+55.3	+56.3	+57.3	+58.3	+59.3	+60.3	+61.3	187
174	+51.4	+52.4	+53.4	+54.4	+55.4	+56.4	+57.4	+58.4	+59.4	+60.4	+61.4	186
175	+51.5	+52.5	+53.5	+54.5	+55.5	+56.5	+57.5	+58.5	+59.5	+60.5	+61.5	185
176	+51.6	+52.6	+53.6	+54.6	+55.6	+56.6	+57.6	+58.6	+59.6	+60.6	+61.6	184
177	+51.7	+52.7	+53.7	+54.7	+55.7	+56.7	+57.7	+58.7	+59.7	+60.7	+61.7	183
178	+51.7	+52.7	+53.7	+54.7	+55.7	+56.7	+57.7	+58.7	+59.7	+60.7	+61.7	182
179	+51.8	+52.8	+53.8	+54.8	+55.8	+56.8	+57.8	+58.8	+59.8	+60.8	+61.8	181
180	+51.8	+52.8	+53.8	+54.8	+55.8	+56.8	+57.8	+58.8	+59.8	+60.8	+61.8	180
a h	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	h a

a h	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	h a
°	°	°	°	°	°	°	°	°	°	°	°	°
135	111.9	111.0	110.0	109.0	108.0	107.0	106.0	104.9	103.8	102.6	101.4	225
136	112.9	112.0	111.0	110.0	109.0	108.0	106.9	105.8	104.7	103.5	102.3	224
137	113.9	113.0	112.0	111.0	110.0	109.0	107.9	106.8	105.7	104.5	103.2	223
138	115.0	114.0	113.0	112.0	111.0	110.0	108.9	107.8	106.7	105.5	104.2	222
139	116.0	115.0	114.0	113.0	112.0	111.0	109.9	108.8	107.7	106.5	105.2	221
140	117.1	116.1	115.1	114.1	113.1	112.1	111.0	109.9	108.7	107.5	106.2	220
141	118.2	117.2	116.2	115.2	114.2	113.1	112.0	110.9	109.7	108.5	107.2	219
142	119.3	118.3	117.3	116.3	115.3	114.2	113.1	112.0	110.8	109.6	108.3	218
143	120.4	119.4	118.4	117.4	116.4	115.3	114.2	113.0	111.8	110.6	109.3	217
144	121.5	120.6	119.6	118.6	117.5	116.4	115.3	114.1	112.9	111.7	110.4	216
145	122.7	121.8	120.8	119.7	118.6	117.5	116.4	115.3	114.1	112.8	111.5	215
146	123.9	123.0	122.0	120.9	119.8	118.7	117.6	116.5	115.3	114.0	112.7	214
147	125.1	124.2	123.2	122.1	121.0	119.9	118.8	117.7	116.5	115.2	113.9	213
148	126.3	125.4	124.4	123.4	122.3	121.2	120.1	118.9	117.7	116.4	115.1	212
149	127.5	126.6	125.6	124.6	123.6	122.5	121.4	120.2	119.0	117.7	116.4	211
150	128.8	127.9	126.9	125.9	124.9	123.8	122.7	121.5	120.3	119.0	117.7	210
151	130.1	129.2	128.2	127.2	126.2	125.1	124.0	122.8	121.6	120.3	119.0	209
152	131.5	130.6	129.6	128.6	127.6	126.5	125.4	124.2	122.9	121.6	120.3	208
153	132.9	132.0	131.0	130.0	129.0	127.9	126.8	125.6	124.3	123.0	121.6	207
154	134.3	133.4	132.5	131.5	130.4	129.3	128.2	127.0	125.8	124.4	123.0	206
155	135.7	134.8	133.9	132.9	131.9	130.8	129.7	128.5	127.3	125.9	124.5	205
156	137.2	136.3	135.4	134.4	133.4	132.3	131.2	130.0	128.8	127.5	126.1	204
157	138.7	137.8	136.9	135.9	134.9	133.8	132.7	131.5	130.3	129.0	127.7	203
158	140.2	139.3	138.4	137.5	136.5	135.4	134.3	133.1	131.9	130.6	129.3	202
159	141.7	140.9	140.0	139.1	138.1	137.0	135.9	134.8	133.6	132.3	131.0	201
160	143.3	142.5	141.6	140.7	139.7	138.7	137.6	136.5	135.3	134.0	132.7	200
161	144.9	144.1	143.2	142.3	141.4	140.4	139.4	138.3	137.1	135.8	134.5	199
162	146.5	145.7	144.9	144.0	143.1	142.2	141.2	140.1	138.9	137.7	136.4	198
163	148.1	147.4	146.6	145.8	144.9	144.0	143.0	141.9	140.8	139.6	138.3	197
164	149.8	149.1	148.3	147.5	146.7	145.8	144.9	143.9	142.8	141.6	140.3	196
165	151.5	150.8	150.1	149.3	148.5	147.7	146.8	145.8	144.8	143.6	142.4	195
166	153.2	152.6	151.9	151.2	150.4	149.6	148.8	147.8	146.8	145.7	144.5	194
167	155.0	154.4	153.7	153.0	152.3	151.6	150.8	149.9	148.9	147.8	146.7	193
168	156.8	156.2	155.6	154.9	154.3	153.6	152.8	151.9	151.0	150.0	148.9	192
169	158.6	158.1	157.5	156.9	156.3	155.6	154.9	154.1	153.2	152.2	151.2	191
170	160.5	160.0	159.4	158.9	158.3	157.7	157.0	156.2	155.4	154.5	153.6	190
171	162.4	161.9	161.4	160.9	160.4	159.8	159.2	158.5	157.7	156.9	156.0	189
172	164.3	163.9	163.4	163.0	162.5	162.0	161.4	160.8	160.1	159.3	158.5	188
173	166.2	165.8	165.4	165.0	164.6	164.2	163.7	163.1	162.5	161.8	161.1	187
174	168.2	167.9	167.5	167.2	166.8	166.4	165.9	165.4	164.9	164.3	163.7	186
175	170.1	169.8	169.5	169.2	168.9	168.6	168.2	167.8	167.3	166.8	166.3	185
176	172.1	171.9	171.6	171.4	171.1	170.8	170.5	170.2	169.8	169.4	169.0	184
177	174.0	173.9	173.7	173.5	173.3	173.1	172.8	172.6	172.3	172.0	171.7	183
178	176.0	175.9	175.8	175.7	175.5	175.4	175.2	175.0	174.8	174.6	174.4	182
179	178.0	178.0	177.9	177.8	177.7	177.7	177.6	177.5	177.4	177.3	177.2	181
180	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180
a h	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	h a

h / a	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
135	+44.3	+45.1	+45.8	+46.5	+47.2	+47.9	+48.6	+49.3	+50.0	+50.7	+51.4	225
136	+44.9	+45.7	+46.4	+47.1	+47.8	+48.5	+49.2	+49.9	+50.6	+51.3	+52.0	224
137	+45.5	+46.3	+47.0	+47.8	+48.5	+49.2	+49.9	+50.6	+51.3	+52.0	+52.7	223
138	+46.1	+46.9	+47.6	+48.4	+49.1	+49.8	+50.5	+51.2	+51.9	+52.6	+53.3	222
139	+46.7	+47.5	+48.2	+49.0	+49.7	+50.5	+51.2	+51.9	+52.6	+53.3	+54.0	221
140	+47.3	+48.1	+48.8	+49.6	+50.3	+51.1	+51.8	+52.5	+53.2	+53.9	+54.6	220
141	+47.9	+48.7	+49.4	+50.2	+50.9	+51.7	+52.4	+53.2	+53.9	+54.6	+55.3	219
142	+48.5	+49.3	+50.0	+50.8	+51.5	+52.3	+53.0	+53.8	+54.5	+55.2	+55.9	218
143	+49.1	+49.9	+50.6	+51.4	+52.1	+52.9	+53.6	+54.4	+55.1	+55.8	+56.5	217
144	+49.6	+50.4	+51.2	+52.0	+52.7	+53.5	+54.2	+55.0	+55.7	+56.4	+57.1	216
145	+50.2	+51.0	+51.8	+52.6	+53.3	+54.1	+54.8	+55.6	+56.3	+57.1	+57.8	215
146	+50.7	+51.5	+52.3	+53.1	+53.9	+54.7	+55.4	+56.2	+56.9	+57.7	+58.4	214
147	+51.3	+52.1	+52.9	+53.7	+54.5	+55.3	+56.0	+56.8	+57.5	+58.3	+59.0	213
148	+51.8	+52.6	+53.4	+54.2	+55.0	+55.8	+56.6	+57.4	+58.1	+58.9	+59.6	212
149	+52.4	+53.2	+54.0	+54.8	+55.6	+56.4	+57.2	+58.0	+58.7	+59.5	+60.2	211
150	+52.9	+53.7	+54.5	+55.3	+56.1	+56.9	+57.7	+58.5	+59.2	+60.0	+60.7	210
151	+53.4	+54.3	+55.1	+55.9	+56.7	+57.5	+58.3	+59.1	+59.8	+60.6	+61.3	209
152	+53.9	+54.8	+55.6	+56.4	+57.2	+58.0	+58.8	+59.6	+60.4	+61.2	+61.9	208
153	+54.4	+55.3	+56.1	+57.0	+57.8	+58.6	+59.4	+60.2	+61.0	+61.8	+62.5	207
154	+54.9	+55.8	+56.6	+57.5	+58.3	+59.1	+59.9	+60.7	+61.5	+62.3	+63.1	206
155	+55.4	+56.3	+57.1	+58.0	+58.8	+59.6	+60.4	+61.3	+62.1	+62.9	+63.7	205
156	+55.8	+56.7	+57.6	+58.5	+59.3	+60.1	+60.9	+61.7	+62.6	+63.4	+64.2	204
157	+56.3	+57.2	+58.1	+59.0	+59.8	+60.6	+61.4	+62.3	+63.1	+63.9	+64.7	203
158	+56.7	+57.6	+58.5	+59.4	+60.2	+61.1	+61.9	+62.8	+63.6	+64.4	+65.2	202
159	+57.1	+58.0	+58.9	+59.8	+60.7	+61.6	+62.4	+63.3	+64.1	+64.9	+65.7	201
160	+57.5	+58.4	+59.3	+60.2	+61.1	+62.0	+62.9	+63.8	+64.6	+65.4	+66.2	200
161	+57.9	+58.8	+59.7	+60.6	+61.5	+62.4	+63.3	+64.2	+65.1	+65.9	+66.7	199
162	+58.3	+59.2	+60.1	+61.0	+61.9	+62.8	+63.7	+64.6	+65.5	+66.4	+67.2	198
163	+58.7	+59.6	+60.5	+61.4	+62.3	+63.2	+64.1	+65.0	+65.9	+67.8	+67.7	197
164	+59.0	+60.0	+60.9	+61.8	+62.7	+63.6	+64.5	+65.4	+66.3	+67.2	+68.1	196
165	+59.3	+60.3	+61.2	+62.2	+63.1	+64.0	+64.9	+65.8	+66.7	+67.6	+68.5	195
166	+59.6	+60.6	+61.5	+62.5	+63.4	+64.3	+65.2	+66.2	+67.1	+68.0	+68.9	194
167	+59.9	+60.9	+61.8	+62.8	+63.7	+64.7	+65.6	+66.6	+67.5	+68.4	+69.3	193
168	+60.2	+61.2	+62.1	+63.1	+64.0	+65.0	+65.9	+66.9	+67.8	+68.7	+69.6	192
169	+60.5	+61.5	+62.4	+63.4	+64.3	+65.3	+66.2	+67.2	+68.1	+69.1	+69.9	191
170	+60.7	+61.7	+62.6	+63.6	+64.5	+65.5	+66.5	+67.5	+68.4	+69.3	+70.2	190
171	+60.9	+61.9	+62.8	+63.8	+64.8	+65.8	+66.8	+67.8	+68.7	+69.6	+70.5	189
172	+61.1	+62.1	+63.0	+64.0	+65.0	+66.0	+67.0	+68.0	+68.9	+69.9	+70.8	188
173	+61.3	+62.3	+63.2	+64.2	+65.2	+66.2	+67.2	+68.2	+69.1	+70.1	+71.1	187
174	+61.4	+62.4	+63.4	+64.4	+65.4	+66.4	+67.4	+68.4	+69.3	+70.3	+71.3	186
175	+61.5	+62.5	+63.5	+64.5	+65.5	+66.5	+67.5	+68.5	+69.5	+70.5	+71.4	185
176	+61.6	+62.6	+63.6	+64.6	+65.6	+66.6	+67.6	+68.6	+69.6	+70.6	+71.5	184
177	+61.7	+62.7	+63.7	+64.7	+65.7	+66.7	+67.7	+68.7	+69.7	+70.7	+71.6	183
178	+61.7	+62.7	+63.7	+64.7	+65.7	+66.7	+67.7	+68.7	+69.7	+70.7	+71.7	182
179	+61.8	+62.8	+63.8	+64.8	+65.8	+66.8	+67.8	+68.8	+69.8	+70.8	+71.8	181
180	+61.8	+62.8	+63.8	+64.8	+65.8	+66.8	+67.8	+68.8	+69.8	+70.8	+71.8	180
a / h	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	h / a

a \ h	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
135	101.4	100.2	98.9	97.6	96.2	94.9	93.5	92.0	90.5	89.0	87.4	225
136	102.3	101.1	99.8	98.5	97.1	95.7	94.3	92.8	91.3	89.7	88.1	224
137	103.2	102.0	100.7	99.4	98.0	96.6	95.1	93.6	92.1	90.5	88.8	223
138	104.2	102.9	101.6	100.3	98.9	97.5	96.0	94.5	92.9	91.3	89.6	222
139	105.2	103.9	102.5	101.2	99.8	98.3	96.8	95.3	93.7	92.0	90.3	221
140	106.2	104.9	103.5	102.1	100.7	99.2	97.7	96.1	94.5	92.8	91.1	220
141	107.2	105.9	104.5	103.1	101.6	100.1	98.6	97.0	95.3	93.6	91.9	219
142	108.3	106.9	105.5	104.1	102.6	101.1	99.5	97.9	96.2	94.5	92.7	218
143	109.3	107.9	106.5	105.1	103.6	102.0	100.4	98.7	97.1	95.3	93.5	217
144	110.4	109.0	107.6	106.1	104.6	103.0	101.4	99.7	98.0	96.2	94.3	216
145	111.5	110.1	108.7	107.2	105.6	104.0	102.4	100.7	98.9	97.1	95.2	215
146	112.7	111.3	109.8	108.3	106.7	105.1	103.4	101.7	99.9	98.0	96.1	214
147	113.9	112.5	111.0	109.4	107.8	106.2	104.5	102.7	100.9	98.9	97.0	213
148	115.1	113.7	112.2	110.6	109.0	107.3	105.6	103.8	101.9	99.9	97.9	212
149	116.4	114.9	113.4	111.8	110.2	108.5	106.7	104.9	103.0	101.0	98.9	211
150	117.7	116.2	114.7	113.1	111.4	109.7	107.9	106.0	104.1	102.0	99.9	210
151	119.0	117.5	116.0	114.4	112.7	110.9	109.1	107.2	105.2	103.1	100.9	209
152	120.3	118.8	117.3	115.7	114.0	112.2	110.4	108.4	106.4	104.2	102.0	208
153	121.6	120.2	118.7	117.0	115.3	113.5	111.7	109.6	107.6	105.4	103.1	207
154	123.0	121.6	120.1	118.4	116.7	114.9	113.0	110.9	108.8	106.6	104.2	206
155	124.5	123.1	121.6	119.9	118.2	116.3	114.4	112.3	110.1	107.9	105.4	205
156	126.1	124.6	123.1	121.5	119.7	117.8	115.8	113.7	111.5	109.2	106.7	204
157	127.7	126.2	124.7	123.1	121.3	119.4	117.3	115.2	112.9	110.6	108.0	203
158	129.3	127.8	126.3	124.7	122.9	121.0	118.9	116.7	114.4	112.0	109.4	202
159	131.0	129.5	128.0	126.4	124.6	122.7	120.6	118.4	116.0	113.6	110.9	201
160	132.7	131.2	129.7	128.1	126.3	124.4	122.3	120.1	117.7	115.2	112.5	200
161	134.5	133.0	131.5	139.9	128.1	126.2	124.1	121.9	119.5	117.0	114.2	199
162	136.4	134.9	133.4	131.8	130.0	128.1	126.0	123.8	121.4	118.8	115.9	198
163	138.3	136.9	135.4	133.8	132.0	130.1	128.0	125.8	123.4	120.7	117.7	197
164	140.3	138.9	137.4	135.8	134.1	132.2	130.1	127.9	125.4	122.7	119.7	196
165	142.4	141.0	139.6	138.0	136.2	134.4	132.4	130.2	127.6	124.9	121.8	195
166	144.5	143.2	141.8	140.2	138.5	136.7	134.7	132.5	130.0	127.2	124.1	194
167	146.7	145.4	144.1	142.6	140.9	139.1	137.1	134.9	132.5	129.7	126.6	193
168	148.9	147.7	146.4	145.0	143.4	141.7	139.7	137.5	135.1	132.4	129.3	192
169	151.2	150.1	148.9	147.5	146.0	144.4	142.4	140.3	137.9	135.3	132.2	191
170	153.6	152.6	151.4	150.1	148.7	147.1	145.2	143.2	140.9	138.3	135.3	190
171	156.0	155.1	154.0	152.8	151.5	149.9	148.2	146.3	144.0	141.5	138.6	189
172	158.5	157.7	156.7	155.5	154.3	152.9	151.3	149.5	147.4	145.0	142.2	188
173	161.1	160.3	159.4	158.4	157.3	156.0	154.6	152.9	150.9	148.7	146.0	187
174	163.7	163.0	162.2	161.3	160.3	159.2	157.9	156.4	154.7	152.6	150.1	186
175	166.3	165.7	165.1	164.3	163.4	162.5	161.4	160.1	158.6	156.8	154.6	185
176	169.0	168.5	168.0	167.3	166.6	165.8	164.9	163.9	162.6	161.1	159.3	184
177	171.7	171.3	170.9	170.4	169.9	169.3	168.6	167.8	166.8	165.6	164.3	183
178	174.4	174.2	173.9	173.6	173.2	172.8	172.3	171.8	171.1	170.3	169.4	182
179	177.2	177.1	176.9	176.8	176.6	176.4	176.1	175.9	175.5	175.1	174.7	181
180	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180
a \ h	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	h \ a

a \ h	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	h / a
°	°	°	°	°	°	°	°	°	°	°	°	°
135	+51.4	+52.1	+52.7	+53.3	+53.9	+54.5	+55.0	+55.6	+56.1	+56.6	+57.1	225
136	+52.0	+52.7	+53.3	+53.9	+54.5	+55.1	+55.7	+56.3	+56.8	+57.3	+57.8	224
137	+52.7	+53.4	+54.0	+54.6	+55.2	+55.8	+56.4	+57.0	+57.5	+58.0	+58.5	223
138	+53.3	+54.0	+54.6	+55.2	+55.8	+56.4	+57.0	+57.6	+58.1	+58.6	+59.1	222
139	+54.0	+54.7	+55.3	+55.9	+56.5	+57.1	+57.7	+58.3	+58.8	+59.3	+59.8	221
140	+54.6	+55.3	+55.9	+56.5	+57.1	+57.7	+58.3	+58.9	+59.4	+60.0	+60.5	220
141	+55.3	+56.0	+56.6	+57.2	+57.8	+58.4	+59.0	+59.6	+60.1	+60.7	+61.2	219
142	+55.9	+56.6	+57.2	+57.8	+58.4	+59.0	+59.6	+60.2	+60.7	+61.3	+61.8	218
143	+56.5	+57.2	+57.9	+58.5	+59.1	+59.7	+60.3	+60.9	+61.4	+62.0	+62.5	217
144	+57.1	+57.8	+58.5	+59.2	+59.8	+60.4	+61.0	+61.6	+62.1	+62.7	+63.2	216
145	+57.8	+58.5	+59.2	+59.9	+60.5	+61.1	+61.7	+62.3	+62.8	+63.4	+63.9	215
146	+58.4	+59.1	+59.8	+60.5	+61.1	+61.7	+62.3	+62.9	+63.4	+64.0	+64.5	214
147	+59.0	+59.7	+60.4	+61.1	+61.7	+62.4	+63.0	+63.6	+64.1	+64.7	+65.2	213
148	+59.6	+60.3	+61.0	+61.7	+62.3	+63.0	+63.6	+64.2	+64.7	+65.3	+65.8	212
149	+60.2	+60.9	+61.6	+62.3	+63.0	+63.7	+64.3	+64.9	+65.4	+66.0	+66.5	211
150	+60.7	+61.5	+62.2	+62.9	+63.6	+64.3	+64.9	+65.5	+66.0	+66.6	+67.1	210
151	+61.3	+62.1	+62.8	+63.5	+64.2	+64.9	+65.5	+66.1	+66.7	+67.3	+67.8	209
152	+61.9	+62.7	+63.4	+64.1	+64.8	+65.5	+66.1	+66.7	+67.3	+67.9	+68.4	208
153	+62.5	+63.3	+64.0	+64.7	+65.4	+66.1	+66.8	+67.4	+68.0	+68.6	+69.1	207
154	+63.1	+63.9	+64.6	+65.3	+66.0	+66.7	+67.4	+68.0	+68.6	+69.2	+69.7	206
155	+63.7	+64.5	+65.2	+65.9	+66.6	+67.3	+68.0	+68.7	+69.3	+69.9	+70.4	205
156	+64.2	+65.0	+65.7	+66.5	+67.2	+67.9	+68.6	+69.3	+69.9	+70.5	+71.0	204
157	+64.7	+65.5	+66.3	+67.1	+67.8	+68.5	+69.2	+69.9	+70.5	+71.1	+71.7	203
158	+65.2	+66.0	+66.8	+67.6	+68.3	+69.1	+69.8	+70.5	+71.1	+71.7	+72.3	202
159	+65.7	+66.6	+67.4	+68.2	+68.9	+69.7	+70.4	+71.1	+71.7	+72.3	+72.9	201
160	+66.2	+67.1	+67.9	+68.7	+69.4	+70.2	+70.9	+71.6	+72.3	+72.9	+73.5	200
161	+66.7	+67.6	+68.4	+69.2	+70.0	+70.8	+71.5	+72.2	+72.9	+73.5	+74.1	199
162	+67.2	+68.1	+68.9	+69.7	+70.5	+71.3	+72.0	+72.7	+73.4	+74.1	+74.7	198
163	+67.7	+68.6	+69.4	+70.2	+71.0	+71.8	+72.5	+73.3	+74.0	+74.7	+75.3	197
164	+68.1	+69.0	+69.8	+70.6	+71.4	+72.2	+73.0	+73.8	+74.5	+75.2	+75.9	196
165	+68.5	+69.4	+70.2	+71.1	+71.9	+72.7	+73.5	+74.3	+75.0	+75.8	+76.5	195
166	+68.9	+69.8	+70.6	+71.5	+72.3	+73.2	+74.0	+74.8	+75.5	+76.3	+77.0	194
167	+69.3	+70.2	+71.0	+71.9	+72.8	+73.7	+74.5	+75.3	+76.0	+76.8	+77.6	193
168	+69.6	+70.5	+71.4	+72.3	+73.2	+74.1	+74.9	+75.7	+76.5	+77.3	+78.1	192
169	+69.9	+70.9	+71.8	+72.7	+73.6	+74.5	+75.3	+76.2	+77.0	+77.8	+78.6	191
170	+70.2	+71.2	+72.1	+73.0	+73.9	+74.8	+75.7	+76.6	+77.4	+78.3	+79.1	190
171	+70.5	+71.5	+72.4	+73.4	+74.3	+75.2	+76.1	+77.0	+77.8	+78.7	+79.6	189
172	+70.8	+71.8	+72.7	+73.7	+74.6	+75.5	+76.4	+77.3	+78.2	+79.1	+80.0	188
173	+71.1	+72.1	+73.0	+74.0	+74.9	+75.8	+76.7	+77.7	+78.6	+79.5	+80.4	187
174	+71.3	+72.3	+73.2	+74.2	+75.1	+76.1	+77.0	+78.0	+78.9	+79.8	+80.7	186
175	+71.5	+72.5	+73.4	+74.4	+75.3	+76.3	+77.2	+78.3	+79.2	+80.1	+81.0	185
176	+71.6	+72.6	+73.5	+74.5	+75.5	+76.5	+77.4	+78.5	+79.4	+80.4	+81.3	184
177	+71.7	+72.7	+73.6	+74.6	+75.6	+76.6	+77.6	+78.6	+79.6	+80.6	+81.5	183
178	+71.7	+72.7	+73.7	+74.7	+75.7	+76.7	+77.7	+78.7	+79.7	+80.7	+81.6	182
179	+71.8	+72.8	+73.8	+74.8	+75.8	+76.8	+77.8	+78.8	+79.8	+80.8	+81.7	181
180	+71.8	+72.8	+73.8	+74.8	+75.8	+76.8	+77.8	+78.8	+79.8	+80.8	+81.8	180
a / h	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	h / a

a h	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	h a
°	°	°	°	°	°	°	°	°	°	°	°	°
135	87.4	85.8	84.1	82.4	80.6	78.8	77.0	75.1	73.2	71.2	69.2	225
136	88.1	86.4	84.7	83.0	81.2	79.4	77.5	75.6	73.6	71.6	69.6	224
137	88.8	87.1	85.4	83.6	81.8	79.9	78.0	76.0	74.0	72.0	70.0	223
138	89.6	87.9	86.1	84.3	82.4	80.5	78.5	76.5	74.5	72.4	70.3	222
139	90.3	88.6	86.8	84.9	83.0	81.0	79.0	76.9	74.9	72.7	70.6	221
140	91.1	89.3	87.5	85.6	83.6	81.6	79.5	77.4	75.3	73.1	70.9	220
141	91.9	90.0	88.2	86.2	84.2	82.1	80.0	77.8	75.7	73.4	71.2	219
142	92.7	90.8	88.9	86.8	84.8	82.7	80.5	78.3	76.1	73.8	71.5	218
143	93.5	91.5	89.6	87.5	85.4	83.3	81.0	78.8	76.5	74.1	71.8	217
144	94.3	92.3	90.3	88.2	86.1	83.9	81.6	79.3	76.9	74.5	72.0	216
145	95.2	93.1	91.1	88.9	86.7	84.5	82.1	79.7	77.3	74.8	72.3	215
146	96.1	94.0	91.9	89.7	87.4	85.1	82.7	80.2	77.7	75.1	72.5	214
147	97.0	94.8	92.7	90.4	88.1	85.7	83.2	80.7	78.1	75.5	72.8	213
148	97.9	95.7	93.5	91.2	88.8	86.3	83.8	81.2	78.5	75.8	73.0	212
149	98.9	96.6	94.3	91.9	89.5	86.9	84.3	81.6	78.9	76.1	73.3	211
150	99.9	97.6	95.2	92.7	90.2	87.6	84.9	82.1	79.3	76.4	73.5	210
151	100.9	98.6	96.1	93.6	91.0	88.3	85.6	82.6	79.7	76.7	73.7	209
152	102.0	99.6	97.1	94.5	91.8	89.0	86.1	83.1	80.1	77.0	73.9	208
153	103.1	100.1	98.1	95.4	92.6	89.7	86.7	83.6	80.5	77.3	74.1	207
154	104.2	101.7	99.1	96.4	93.5	90.5	87.4	84.2	80.9	77.6	74.2	206
155	106.4	102.9	100.2	97.4	94.4	91.3	88.0	84.7	81.3	77.9	74.4	205
156	107.7	104.1	101.3	98.4	95.3	92.1	88.7	85.2	81.7	78.1	74.5	204
157	108.0	105.4	102.5	99.5	96.3	92.9	89.4	85.7	82.1	78.4	74.6	203
158	109.4	106.7	103.8	100.7	97.3	93.8	90.1	86.3	82.5	78.6	74.7	202
159	110.9	108.1	105.1	101.9	98.4	94.7	90.9	86.9	82.9	78.9	74.7	201
160	112.5	109.6	106.5	103.1	99.5	95.7	91.7	87.6	83.4	79.1	74.7	200
161	114.2	111.1	108.0	104.4	100.6	96.7	92.6	88.2	83.8	79.3	74.6	199
162	115.9	112.8	109.5	105.8	101.9	97.8	93.5	88.9	84.2	79.4	74.6	198
163	117.7	114.6	111.1	107.3	103.3	99.0	94.5	89.6	84.6	79.6	74.5	197
164	119.7	116.5	112.9	109.0	104.8	100.3	95.5	90.4	85.1	79.7	74.3	196
165	121.8	118.5	114.8	110.8	106.5	101.7	96.6	91.2	85.6	79.8	74.1	195
166	124.1	120.7	116.9	112.8	108.3	103.2	97.8	92.1	86.1	79.9	73.7	194
167	126.6	123.1	119.2	115.0	110.2	104.9	99.2	93.0	86.5	79.9	73.3	193
168	129.3	125.8	121.8	117.4	112.4	106.9	100.7	94.0	87.0	79.8	72.7	192
169	132.2	128.7	124.7	120.1	114.9	109.0	102.4	95.2	87.5	79.7	71.9	191
170	135.3	131.9	127.8	123.1	117.6	111.4	104.3	96.5	88.1	79.5	70.9	190
171	138.6	135.3	131.2	126.4	120.7	114.1	106.5	97.9	88.7	79.1	69.7	189
172	142.2	138.9	134.9	130.1	124.3	117.3	109.1	99.6	89.3	78.5	68.1	188
173	146.0	142.8	139.0	134.3	128.4	121.2	112.3	101.8	90.0	77.7	66.0	187
174	150.1	147.1	143.5	139.1	133.2	125.7	116.2	104.4	90.8	76.6	63.2	186
175	154.6	151.9	148.6	144.4	138.7	131.2	121.2	107.8	91.8	74.7	59.4	185
176	159.3	157.0	154.1	150.4	145.2	138.0	127.6	112.7	93.1	72.0	54.1	184
177	164.3	162.6	160.1	157.0	152.6	146.2	136.1	119.8	94.9	67.2	46.5	183
178	169.4	168.3	166.5	164.1	161.0	156.1	147.6	131.2	98.3	58.6	35.5	182
179	174.7	174.1	173.2	172.0	170.3	167.4	162.5	150.5	107.1	39.7	18.5	181
180	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	0.0	0.0	180
a h	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	h a

a h	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	h a
°	°	°	°	°	°	°	°	°	°	°	°	°
135	+57.1	+57.6	+58.0	+58.5	+58.9	+59.3	+59.6	+60.0	+60.4	+60.7	+61.0	225
136	+57.8	+58.3	+58.7	+59.2	+59.6	+60.0	+60.3	+60.7	+61.0	+61.3	+61.6	224
137	+58.5	+59.0	+59.4	+59.9	+60.3	+60.7	+61.0	+61.4	+61.7	+62.0	+62.2	223
138	+59.1	+59.6	+60.0	+60.5	+60.9	+61.3	+61.6	+62.0	+62.3	+62.6	+62.8	222
139	+59.8	+60.3	+60.7	+61.2	+61.6	+62.0	+62.3	+62.7	+63.0	+63.3	+63.5	221
140	+60.5	+61.0	+61.4	+61.9	+62.3	+62.7	+63.0	+63.3	+63.6	+63.9	+64.1	220
141	+61.2	+61.7	+62.1	+62.6	+63.0	+63.4	+63.7	+64.0	+64.3	+64.5	+64.7	219
142	+61.8	+62.3	+62.8	+63.2	+63.6	+64.0	+64.3	+64.6	+64.9	+65.1	+65.3	218
143	+62.5	+63.1	+63.5	+63.9	+64.3	+64.7	+65.0	+65.3	+65.6	+65.8	+66.0	217
144	+63.2	+63.8	+64.1	+64.5	+64.9	+65.3	+65.6	+65.9	+66.2	+66.4	+66.6	216
145	+63.9	+64.4	+64.8	+65.2	+65.6	+66.0	+66.3	+66.6	+66.9	+67.1	+67.3	215
146	+64.5	+65.0	+65.5	+65.9	+66.3	+66.7	+67.0	+67.3	+67.5	+67.7	+67.9	214
147	+65.2	+65.7	+66.2	+66.6	+67.0	+67.4	+67.7	+68.0	+68.2	+68.4	+68.6	213
148	+65.8	+66.3	+66.8	+67.2	+67.6	+68.0	+68.3	+68.6	+68.8	+69.0	+69.2	212
149	+66.5	+67.0	+67.5	+67.9	+68.3	+68.7	+69.0	+69.3	+69.5	+69.7	+69.9	211
150	+67.1	+67.6	+68.1	+68.5	+68.9	+69.3	+69.6	+69.9	+70.1	+70.3	+70.5	210
151	+67.8	+68.3	+68.8	+69.2	+69.6	+70.0	+70.3	+70.6	+70.8	+71.0	+71.1	209
152	+68.4	+68.9	+69.4	+69.8	+70.2	+70.6	+70.9	+71.2	+71.4	+71.6	+71.7	208
153	+69.1	+69.6	+70.1	+70.5	+70.9	+71.3	+71.6	+71.9	+72.1	+72.3	+72.4	207
154	+69.7	+70.2	+70.7	+71.1	+71.5	+71.9	+72.2	+72.5	+72.7	+72.9	+73.0	206
155	+70.4	+70.9	+71.4	+71.8	+72.2	+72.6	+72.9	+73.2	+73.4	+73.5	+73.6	205
156	+71.0	+71.5	+72.0	+72.5	+72.9	+73.3	+73.6	+73.8	+74.0	+74.1	+74.2	204
157	+71.7	+72.2	+72.7	+73.2	+73.6	+74.0	+74.3	+74.5	+74.7	+74.8	+74.9	203
158	+72.3	+72.8	+73.3	+73.8	+74.2	+74.6	+74.9	+75.1	+75.3	+75.4	+75.5	202
159	+72.9	+73.5	+74.0	+74.5	+74.9	+75.3	+75.6	+75.8	+76.0	+76.1	+76.1	201
160	+73.5	+74.1	+74.6	+75.1	+75.5	+75.9	+76.2	+76.4	+76.6	+76.7	+76.7	200
161	+74.1	+74.7	+75.3	+75.8	+76.2	+76.6	+76.9	+77.1	+77.3	+77.4	+77.4	199
162	+74.7	+75.3	+75.9	+76.4	+76.9	+77.3	+77.6	+77.8	+78.0	+78.1	+78.0	198
163	+75.3	+76.0	+76.6	+77.1	+77.6	+78.0	+78.3	+78.5	+78.7	+78.8	+78.7	197
164	+75.9	+76.6	+77.2	+77.7	+78.2	+78.6	+78.9	+79.1	+79.3	+79.4	+79.4	196
165	+76.5	+77.2	+77.8	+78.3	+78.8	+79.2	+79.6	+79.8	+80.0	+80.1	+80.1	195
166	+77.0	+77.7	+78.4	+78.9	+79.4	+79.8	+80.2	+80.5	+80.7	+80.8	+80.7	194
167	+77.6	+78.3	+79.0	+79.5	+80.1	+80.5	+80.9	+81.2	+81.4	+81.5	+81.4	193
168	+78.1	+78.8	+79.5	+80.1	+80.7	+81.1	+81.5	+81.8	+82.0	+82.1	+82.0	192
169	+78.6	+79.4	+80.1	+80.7	+81.4	+81.8	+82.2	+82.5	+82.7	+82.8	+82.6	191
170	+79.1	+79.9	+80.6	+81.3	+82.0	+82.4	+82.8	+83.2	+83.4	+83.4	+83.2	190
171	+79.6	+80.4	+81.1	+81.9	+82.6	+83.0	+83.4	+83.8	+84.1	+84.1	+83.9	189
172	+80.0	+80.8	+81.6	+82.4	+83.1	+83.6	+84.1	+84.5	+84.7	+84.7	+84.5	188
173	+80.4	+81.2	+82.1	+82.9	+83.6	+84.2	+84.8	+85.2	+85.4	+85.3	+85.1	187
174	+80.7	+81.6	+82.5	+83.3	+84.1	+84.8	+85.4	+85.8	+86.0	+85.9	+85.7	186
175	+81.0	+82.0	+82.9	+83.7	+84.5	+85.3	+86.0	+86.5	+86.7	+86.6	+86.3	185
176	+81.3	+82.3	+83.2	+84.1	+84.9	+85.7	+86.5	+87.1	+87.3	+87.2	+86.8	184
177	+81.5	+82.5	+83.4	+84.4	+85.2	+86.1	+86.9	+87.6	+88.0	+87.9	+87.4	183
178	+81.6	+82.6	+83.6	+84.6	+85.5	+86.5	+87.4	+88.1	+88.6	+88.5	+87.8	182
179	+81.7	+82.7	+83.7	+84.7	+85.7	+86.7	+87.7	+88.6	+89.2	+89.0	+88.1	181
180	+81.8	+82.8	+83.8	+84.8	+85.8	+86.8	+87.8	+88.8	+89.8	+89.2	+88.2	180
a h	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	h a

a \ h	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
135	69.2	67.3	65.3	63.3	61.2	59.1	56.9	54.8	52.7	50.6	48.4	225
136	69.6	67.6	65.5	63.4	61.3	59.2	57.0	54.9	52.7	50.5	48.3	224
137	70.0	67.9	65.7	63.6	61.4	59.3	57.1	54.9	52.7	50.5	48.2	223
138	70.3	68.1	65.9	63.7	61.5	59.3	57.1	54.9	52.6	50.4	48.1	222
139	70.6	68.4	66.1	63.9	61.6	59.4	57.1	54.8	52.5	50.3	48.0	221
140	70.9	68.6	66.3	64.0	61.7	59.4	57.0	54.7	52.4	50.1	47.8	220
141	71.2	68.9	66.5	64.2	61.8	59.4	57.0	54.6	52.3	49.9	47.6	219
142	71.5	69.1	66.7	64.3	61.8	59.3	56.9	54.5	52.1	49.7	47.4	218
143	71.8	69.3	66.9	64.4	61.9	59.3	56.9	54.4	52.0	49.5	47.2	217
144	72.0	69.5	67.0	64.5	61.9	59.3	56.8	54.3	51.8	49.3	46.9	216
145	72.3	69.7	67.1	64.5	61.9	59.2	56.7	54.1	51.6	49.0	46.6	215
146	72.5	69.9	67.2	64.5	61.8	59.1	56.5	53.9	51.3	48.7	46.2	214
147	72.8	70.1	67.3	64.6	61.8	59.0	56.3	53.6	51.0	48.4	45.8	213
148	73.0	70.2	67.4	64.6	61.7	58.9	56.1	53.3	50.6	48.0	45.4	212
149	73.3	70.4	67.4	64.6	61.6	58.7	55.9	53.0	50.3	47.6	45.0	211
150	73.5	70.5	67.5	64.5	61.5	58.5	55.6	52.7	49.9	47.2	44.5	210
151	73.7	70.6	67.5	64.4	61.3	58.3	55.3	52.3	49.5	46.7	44.0	209
152	73.9	70.7	67.5	64.3	61.1	58.0	54.9	51.9	49.0	46.2	43.4	208
153	74.1	70.8	67.4	64.2	60.9	57.7	54.5	51.5	48.5	45.6	42.8	207
154	74.2	70.8	67.4	64.0	60.6	57.3	54.1	51.0	47.9	45.0	42.2	206
155	74.4	70.8	67.3	63.8	60.3	56.9	53.6	50.4	47.3	44.3	41.5	205
156	74.5	70.8	67.1	63.5	59.9	56.4	53.0	49.7	46.6	43.6	40.7	204
157	74.6	70.7	66.9	63.2	59.5	55.8	52.3	49.0	45.8	42.8	39.9	203
158	74.7	70.7	66.7	62.8	59.0	55.2	51.6	48.2	45.0	41.9	39.0	202
159	74.7	70.6	66.4	62.4	58.5	54.6	50.8	47.3	44.0	40.9	38.0	201
160	74.7	70.4	66.1	61.9	57.8	53.8	50.0	46.4	43.0	39.9	37.0	200
161	74.6	70.1	65.6	61.2	57.0	52.9	49.1	45.4	41.9	38.8	35.9	199
162	74.6	69.8	65.1	60.5	56.1	51.9	48.0	44.3	40.8	37.6	34.7	198
163	74.5	69.4	64.5	59.7	55.1	50.8	46.8	43.1	39.5	36.4	33.5	197
164	74.3	68.9	63.7	58.7	54.0	49.6	45.5	41.7	38.2	35.1	32.2	196
165	74.1	68.3	62.8	57.6	52.7	48.2	44.0	40.2	36.8	33.6	30.8	195
166	73.7	67.6	61.8	56.4	51.3	46.7	42.4	38.6	35.2	32.1	29.3	194
167	73.3	66.8	60.7	55.0	49.7	45.0	40.7	36.9	33.5	30.5	27.7	193
168	72.7	65.8	59.3	53.3	47.9	43.1	38.8	35.0	31.7	28.8	26.1	192
169	71.9	64.5	57.6	51.4	45.7	41.0	36.7	32.9	29.7	26.9	24.3	191
170	70.9	63.0	55.7	49.2	43.5	38.6	34.4	30.7	27.6	24.9	22.5	190
171	69.7	61.0	53.4	46.6	40.8	36.0	31.9	28.3	25.4	22.8	20.5	189
172	68.1	58.7	50.6	43.6	37.8	33.1	29.1	25.8	23.0	20.6	18.5	188
173	66.0	55.8	47.2	40.2	34.5	29.9	26.1	23.1	20.4	18.2	16.4	187
174	63.2	52.1	43.2	36.2	30.7	26.4	22.9	20.2	17.8	15.8	14.2	186
175	59.4	47.4	38.4	31.7	26.5	22.6	19.5	17.1	15.0	13.3	11.9	185
176	54.1	41.4	32.6	26.5	21.9	18.5	15.9	13.9	12.2	10.8	9.6	184
177	46.5	33.7	25.8	20.7	16.9	14.1	12.1	10.5	9.2	8.2	7.3	183
178	35.5	24.1	18.0	14.2	11.6	9.6	8.2	7.1	6.2	5.5	4.9	182
179	18.5	12.7	9.2	7.4	5.9	4.9	4.1	3.6	3.1	2.8	2.5	181
180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	180
a \ h	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	h \ a

a \ h	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
135	+61.0	+61.2	+61.4	+61.6	+61.7	+61.8	+61.9	+61.9	+61.9	+61.8	+61.8	225
136	+61.6	+61.8	+62.0	+62.2	+62.3	+62.4	+62.4	+62.4	+62.4	+62.4	+62.3	224
137	+62.2	+62.4	+62.6	+62.8	+62.9	+63.0	+63.0	+63.0	+63.0	+62.9	+62.8	223
138	+62.8	+63.0	+63.2	+63.3	+63.4	+63.5	+63.5	+63.5	+63.5	+63.4	+63.3	222
139	+63.5	+63.7	+63.8	+63.9	+64.0	+64.1	+64.1	+64.0	+64.0	+63.9	+63.8	221
140	+64.1	+64.3	+64.4	+64.5	+64.6	+64.6	+64.6	+64.6	+64.5	+64.4	+64.[illegible]	220
141	+64.7	+64.9	+65.0	+65.1	+65.2	+65.2	+65.2	+65.2	+65.1	+65.0	+64.8	219
142	+65.3	+65.5	+65.6	+65.7	+65.8	+65.8	+65.8	+65.7	+65.6	+65.5	+65.3	218
143	+66.0	+66.2	+66.2	+66.3	+66.4	+66.4	+66.4	+66.3	+66.2	+66.0	+65.8	217
144	+66.6	+66.8	+66.9	+66.9	+67.0	+67.0	+66.9	+66.8	+66.7	+66.5	+66.3	216
145	+67.3	+67.4	+67.5	+67.5	+67.5	+67.5	+67.5	+67.4	+67.2	+67.0	+66.8	215
146	+67.9	+68.0	+68.1	+68.1	+68.1	+68.1	+68.0	+67.9	+67.7	+67.5	+67.3	214
147	+68.6	+68.7	+68.7	+68.7	+68.7	+68.7	+68.6	+68.4	+68.2	+68.0	+67.8	213
148	+69.2	+69.3	+69.3	+69.3	+69.3	+69.2	+69.1	+68.9	+68.7	+68.5	+68.2	212
149	+69.9	+70.0	+70.0	+69.9	+69.9	+69.8	+69.6	+69.4	+69.2	+69.0	+68.7	211
150	+70.5	+70.6	+70.6	+70.5	+70.5	+70.4	+70.2	+70.0	+69.7	+69.4	+69.1	210
151	+71.1	+71.2	+71.2	+71.2	+71.1	+70.9	+70.7	+70.5	+70.2	+69.9	+69.6	209
152	+71.7	+71.8	+71.8	+71.8	+71.7	+71.5	+71.3	+71.0	+70.7	+70.4	+70.0	208
153	+72.4	+72.4	+72.4	+72.4	+72.3	+72.1	+71.9	+71.6	+71.2	+70.9	+70.5	207
154	+73.0	+73.0	+73.0	+72.9	+72.8	+72.6	+72.4	+72.1	+71.7	+71.3	+70.9	206
155	+73.6	+73.6	+73.6	+73.5	+73.4	+73.2	+72.9	+72.6	+72.2	+71.8	+71.4	205
156	+74.2	+74.2	+74.2	+74.1	+73.9	+73.7	+73.4	+73.1	+72.7	+72.3	+71.8	204
157	+74.9	+74.9	+74.8	+74.7	+74.5	+74.3	+74.0	+73.6	+73.2	+72.8	+72.3	203
158	+75.5	+75.5	+75.4	+75.3	+75.1	+74.8	+74.5	+74.1	+73.7	+73.2	+72.7	202
159	+76.1	+76.1	+76.0	+75.9	+75.7	+75.4	+75.0	+74.6	+74.2	+73.7	+73.1	201
160	+76.7	+76.7	+76.6	+76.4	+76.2	+75.9	+75.5	+75.1	+74.6	+74.1	+73.5	200
161	+77.4	+77.4	+77.3	+77.0	+76.8	+76.4	+76.0	+75.6	+75.1	+74.5	+73.9	199
162	+78.0	+78.0	+77.9	+77.6	+77.3	+76.9	+76.5	+76.0	+75.5	+74.9	+74.3	198
163	+78.7	+78.7	+78.5	+78.2	+77.9	+77.5	+77.0	+76.5	+75.9	+75.3	+74.7	197
164	+79.4	+79.3	+79.1	+78.8	+78.4	+78.0	+77.5	+76.9	+76.3	+75.7	+75.0	196
165	+80.1	+79.9	+79.7	+79.4	+79.0	+78.5	+78.0	+77.4	+76.7	+76.1	+75.4	195
166	+80.7	+80.5	+80.3	+79.9	+79.5	+79.0	+78.4	+77.8	+77.1	+76.4	+75.7	194
167	+81.4	+81.2	+80.9	+80.5	+80.0	+79.5	+78.9	+78.2	+77.5	+76.8	+76.0	193
168	+82.0	+81.8	+81.4	+81.0	+80.5	+79.9	+79.3	+78.6	+77.9	+77.1	+76.3	192
169	+82.6	+82.4	+82.0	+81.5	+81.0	+80.4	+79.7	+79.0	+78.2	+77.4	+76.6	191
170	+83.2	+82.9	+82.5	+82.0	+81.5	+80.8	+80.1	+79.3	+78.5	+77.7	+76.8	190
171	+83.9	+83.5	+83.1	+82.5	+81.9	+81.2	+80.5	+79.7	+78.8	+78.0	+77.1	189
172	+84.5	+84.1	+83.6	+83.0	+82.3	+81.6	+80.8	+80.0	+79.1	+78.2	+77.3	188
173	+85.1	+84.7	+84.1	+83.5	+82.7	+82.0	+81.1	+80.3	+79.4	+78.5	+77.5	187
174	+85.7	+85.2	+84.6	+83.9	+83.1	+82.3	+81.4	+80.5	+79.6	+78.7	+77.7	186
175	+86.3	+85.7	+85.0	+84.3	+83.4	+82.6	+81.6	+80.7	+79.8	+78.9	+77.9	185
176	+86.8	+86.2	+85.4	+84.6	+83.7	+82.8	+81.8	+80.9	+79.9	+79.0	+78.0	184
177	+87.4	+86.6	+85.7	+84.8	+83.9	+83.0	+82.0	+81.0	+80.0	+79.1	+78.1	183
178	+87.8	+86.9	+85.9	+85.0	+84.1	+83.1	+82.1	+81.1	+80.1	+79.1	+78.2	182
179	+88.1	+87.1	+86.1	+85.1	+84.2	+83.2	+82.2	+81.2	+80.2	+79.2	+78.2	181
180	+88.2	+87.2	+86.2	+85.2	+84.2	+83.2	+82.2	+81.2	+80.2	+79.2	+78.2	180
a \ h	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°	h \ a

a \ h	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	h \ a
°	°	°	°	°	°	°	°	°	°	°	°	°
135	48.4	46.3	44.2	42.2	40.1	38.1	36.1	34.2	32.3	30.4	28.5	225
136	48.3	46.2	44.0	42.0	39.9	37.9	35.9	34.0	32.0	30.1	28.2	224
137	48.2	46.1	43.9	41.8	39.7	37.6	35.6	33.7	31.7	29.8	28.0	223
138	48.1	45.9	43.7	41.5	39.4	37.3	35.3	33.3	31.4	29.5	27.7	222
139	48.0	45.7	43.5	41.3	39.2	37.1	35.0	33.0	31.1	29.2	27.4	221
140	47.8	45.5	43.3	41.1	38.9	36.8	34.7	32.7	30.8	28.9	27.1	220
141	47.6	45.3	43.0	40.8	38.6	36.5	34.4	32.4	30.5	28.6	26.8	219
142	47.4	45.0	42.7	40.5	38.3	36.1	34.0	32.0	30.1	28.2	26.4	218
143	47.2	44.8	42.4	40.2	38.0	35.8	33.7	31.7	29.7	27.8	26.0	217
144	46.9	44.5	42.1	39.8	37.6	35.4	33.3	31.3	29.3	27.4	25.6	216
145	46.6	44.2	41.8	39.5	37.2	35.0	32.9	30.9	28.9	27.0	25.2	215
146	46.2	43.8	41.4	39.1	36.8	34.6	32.5	30.4	28.4	26.5	24.7	214
147	45.8	43.4	41.0	38.6	36.3	34.1	32.0	30.0	28.0	26.1	24.3	213
148	45.4	42.9	40.5	38.1	35.8	33.6	31.5	29.5	27.5	25.6	23.8	212
149	45.0	42.4	40.0	37.6	35.3	33.1	31.0	29.0	27.0	25.1	23.3	211
150	44.5	41.9	39.4	37.0	34.7	32.5	30.4	28.4	26.4	24.6	22.8	210
151	44.0	41.3	38.8	36.4	34.1	31.9	29.8	27.8	25.9	24.1	22.3	209
152	43.4	40.7	38.2	35.8	33.5	31.3	29.2	27.2	25.3	23.5	21.8	208
153	42.8	40.1	37.6	35.2	32.9	30.7	28.6	26.6	24.7	23.0	21.3	207
154	42.2	39.5	36.9	34.5	32.2	30.0	27.9	26.0	24.1	22.4	20.7	206
155	41.5	38.8	36.2	33.8	31.5	29.3	27.2	25.3	23.5	21.8	20.1	205
156	40.7	38.0	35.4	33.0	30.7	28.5	26.5	24.6	22.8	21.1	19.5	204
157	39.9	37.2	34.6	32.2	29.9	27.8	25.8	23.9	22.1	20.4	18.8	203
158	39.0	36.3	33.7	31.3	29.0	27.0	25.0	23.1	21.3	19.6	18.1	202
159	38.0	35.3	32.8	30.4	28.1	26.1	24.2	22.3	20.6	19.0	17.5	201
160	37.0	34.3	31.8	29.4	27.2	25.2	23.3	21.5	19.8	18.2	16.8	200
161	35.9	33.2	30.7	28.4	26.2	24.3	22.4	20.6	19.0	17.5	16.1	199
162	34.8	32.1	29.6	27.3	25.2	23.3	21.5	19.8	18.2	16.7	15.4	198
163	33.5	30.9	28.4	26.2	24.1	22.3	20.5	18.9	17.4	16.0	14.7	197
164	32.2	29.6	27.2	25.0	23.0	21.2	19.5	18.0	16.5	15.2	13.9	196
165	30.8	28.3	25.9	23.8	21.8	20.1	18.5	17.0	15.6	14.3	13.1	195
166	29.3	26.9	24.6	22.5	20.6	18.9	17.4	16.0	14.7	13.4	12.3	194
167	27.7	25.4	23.2	21.2	19.4	17.8	16.3	15.0	13.7	12.5	11.5	193
168	26.1	23.8	21.7	19.8	18.1	16.6	15.2	13.9	12.7	11.6	10.6	192
169	24.3	22.1	20.1	18.4	16.8	15.3	14.0	12.8	11.7	10.7	9.8	191
170	22.5	20.4	18.5	16.9	15.4	14.0	12.8	11.7	10.7	9.8	9.0	190
171	20.5	18.6	16.8	15.3	14.0	12.2	11.6	10.6	9.7	8.9	8.2	189
172	18.5	16.7	15.1	13.7	12.5	11.4	10.4	9.5	8.7	8.0	7.3	188
173	16.4	14.7	13.3	12.1	11.0	10.1	9.2	8.4	7.7	7.0	6.4	187
174	14.2	12.7	11.5	10.4	9.5	8.7	7.9	7.2	6.6	6.0	5.5	186
175	11.9	10.7	9.7	8.8	8.0	7.3	6.6	6.0	5.5	5.0	4.6	185
176	9.6	8.6	7.8	7.1	6.4	5.8	5.3	4.8	4.4	4.0	3.7	184
177	7.2	6.5	5.9	5.4	4.8	4.4	4.0	3.6	3.3	3.0	2.8	183
178	4.9	4.4	4.0	3.6	3.2	2.9	2.6	2.4	2.2	2.0	1.9	182
179	2.4	2.2	2.0	1.8	1.6	1.5	1.3	1.2	1.1	1.0	1.0	181
180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	180
a \ h	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	h \ a

a h	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	h a
″	°	°	°	°	°	°	°	°	°	°	°	°
135	+61.8	+61.7	+61.6	+61.5	+61.3	+61.0	+60.7	+60.5	+60.2	+59.9	+59.5	225
136	+62.3	+62.2	+62.1	+61.9	+61.7	+61.4	+61.1	+60.8	+60.5	+60.2	+59.8	224
137	+62.8	+62.7	+62.6	+62.4	+62.1	+61.8	+61.5	+61.2	+60.9	+60.5	+60.1	223
138	+63.3	+63.2	+63.0	+62.8	+62.5	+62.2	+61.9	+61.6	+61.2	+60.8	+60.4	222
139	+63.8	+63.7	+63.5	+63.3	+63.0	+62.7	+62.3	+62.0	+61.6	+61.2	+60.7	221
140	+64.3	+64.1	+63.9	+63.7	+63.4	+63.1	+62.7	+62.3	+61.9	+61.5	+61.0	220
141	+64.8	+64.6	+64.4	+64.1	+63.8	+63.5	+63.1	+62.7	+62 3	+61.8	+61.3	219
142	+65.3	+65.1	+64.8	+64.5	+64.2	+63.8	+63.4	+63.0	+62.6	+62.1	+61.6	218
143	+65.8	+65.6	+65.3	+65.0	+64.6	+64.2	+63.8	+63.4	+63.0	+62.5	+61.9	217
144	+66.3	+66.0	+65.7	+65.4	+65.0	+64.6	+64.2	+63.8	+63.3	+62.8	+62.2	216
145	+66.8	+66.5	+66.2	+65.8	+65.4	+65.0	+64.6	+64.1	+63.6	+63.1	+62.5	215
146	+67.3	+67.0	+66.6	+66.2	+65.8	+65.4	+64.9	+64.4	+63.9	+63 4	+62.8	214
147	+67.8	+67.5	+67.1	+66.7	+66.2	+65.8	+65.3	+64.8	+64.3	+63.7	+63.1	213
148	+68.2	+67.9	+67.5	+67.1	+66.6	+66.1	+65 6	+65.1	+64.6	+64.0	+63.4	212
149	+68.7	+68.3	+67.9	+67.5	+67.0	+66.5	+66.0	+65.5	+64.9	+64.3	+63.7	211
150	+69 1	+68.7	+68.3	+67.9	+67.4	+66.9	+66.3	+65.8	+65.2	+64.6	+63.9	210
151	+69.6	+69.2	+68.7	+68.3	+67.8	+67.2	+66.6	+66.1	+65.5	+64.9	+64.2	209
152	+70.0	+69.6	+69 1	+68.6	+68.1	+67.5	+66.9	+66.3	+65.7	+65.1	+64.4	208
153	+70.5	+70.0	+69.5	+69.0	+68.5	+67.9	+67.3	+66.7	+66.0	+65.4	+64.7	207
154	+70.9	+70.4	+69.9	+69.4	+68.8	+68.2	+67.6	+67.0	+66.3	+65.6	+64.9	206
155	+71.4	+70.9	+70.4	+69.8	+69.2	+68.6	+67.9	+67.3	+66.6	+65.9	+65.1	205
156	+71.8	+71.3	+70.8	+70.2	+69.6	+68.9	+68.2	+67.5	+66.8	+66.1	+65.3	204
157	+72.3	+71.8	+71.2	+70.6	+70.0	+69.3	+68 5	+67.8	+67.1	+66.3	+65.5	203
158	+72.7	+72.2	+71.6	+71.0	+70.3	+69.6	+68.8	+68.1	+67.3	+66.5	+65.7	202
159	+73.1	+72.6	+72.0	+71.3	+70.6	+69.9	+69.1	+68.4	+67.6	+66.8	+66.0	201
160	+73.5	+72.9	+72.3	+71.6	+70.9	+70.2	+69.4	+68.6	+67.8	+67.0	+66.2	200
161	+73.9	+73.3	+72.7	+72.0	+71.2	+70.5	+69.7	+68.9	+68.0	+67.2	+66.4	199
162	+74.3	+73.7	+73.0	+72.3	+71.5	+70.7	+69.9	+69.1	+68.2	+67.4	+66.5	198
163	+74.7	+74.0	+73.3	+72.6	+71.8	+71.0	+70.1	+69.3	+68.4	+67.6	+66.7	197
164	+75.0	+74.3	+73.6	+72.8	+72.0	+71.2	+70.3	+69.5	+68.6	+67.8	+66.9	196
165	+75.4	+74.7	+73.9	+73.1	+72.3	+71.4	+70.5	+69.7	+68.8	+68.0	+67.1	195
166	+75.7	+74.9	+74.1	+73.3	+72.5	+71.6	+70.7	+69.9	+69.0	+68.1	+67.2	194
167	+76.0	+75.2	+74.4	+73.6	+72.7	+71.8	+70.9	+70.1	+69.2	+68.3	+67.4	193
168	+76.3	+75.5	+74.6	+73.8	+72.9	+72.0	+71.1	+70.2	+69.3	+68.4	+67.5	192
169	+76.6	+75.8	+74.9	+74.0	+73.1	+72.2	+71.3	+70.4	+69.5	+68.6	+67.6	191
170	+76.8	+76.0	+75.1	+74.2	+73.3	+72.4	+71.4	+70.5	+69.6	+68.7	+67.7	190
171	+77.1	+76.2	+75.3	+74.4	+73.5	+72.6	+71.6	+70.7	+69.7	+68.8	+67.8	189
172	+77.3	+76.4	+75.5	+74.6	+73.6	+72.7	+71.7	+70.8	+69.8	+68.9	+67.9	188
173	+77.5	+76.6	+75.7	+74.8	+73.8	+72.8	+71.8	+70.9	+69.9	+69.0	+68.0	187
174	+77.7	+76 8	+75.8	+74 9	+73.9	+72.9	+71.9	+71.0	+70.0	+69.0	+68.0	186
175	+77.9	+77.0	+76.0	+75.0	+74.0	+73.0	+72.0	+71.1	+70.1	+69.1	+68.1	185
176	+78.0	+77.1	+76.1	+75.1	+74.1	+73.1	+72.1	+71.1	+70.1	+69.1	+68.1	184
177	+78.1	+77.2	+76.2	+75.2	+74.2	+73.2	+72.2	+71.2	+70.2	+69.2	+68.2	183
178	+78.2	+77.2	+76.2	+75.2	+74.2	+73.2	+72.2	+71.2	+70.2	+69.2	+68.2	182
179	+78.2	+77.2	+76.2	+75.2	+74.2	+73.2	+72.2	+71.2	+70.2	+69.2	+68.2	181
180	+78.2	+77.2	+76.2	+75.2	+74.2	+73.2	+72.2	+71.2	+70 2	+69.2	+68.2	180
a h	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	70°	h a

a h	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	h a
°	°	°	°	°	°	°	°	°	°	°	°	°
135	28.5	26.7	24.9	23.2	21.5	19.9	18.3	16.7	15.2	13.7	12.3	225
136	28.2	26.4	24.6	22.9	21.2	19.6	18.0	16.5	15.0	13.5	12.1	224
137	28.0	26.2	24.4	22.7	21.0	19.4	17.8	16.3	14.8	13.3	11.9	223
138	27.7	25.9	24.1	22.4	20.7	19.1	17.5	16.0	14.6	13.1	11.7	222
139	27.4	25.6	23.8	22.1	20.4	18.8	17.3	15.8	14.4	12.9	11.5	221
140	27.1	25.3	23.5	21.8	20.1	18.5	17.0	15.5	14.1	12.7	11.3	220
141	26.8	25.0	23.2	21.5	19.8	18.3	16.8	15.3	13.9	12.5	10.1	219
142	26.4	24.6	22.8	21.1	19.5	18.0	16.5	15.0	13.6	12.2	10.9	218
143	26.0	24.2	22.5	20.8	19.2	17.7	16.2	14.8	13.4	12.0	10.7	217
144	25.6	23.8	22.1	20.5	18.9	17.4	15.9	14.5	13.1	11.8	10.5	216
145	25.2	23.4	21.7	20.1	18.6	17.1	15.6	14.2	12.9	11.5	10.3	215
146	24.7	23.0	21.3	19.7	18.2	16.7	15.3	13.9	12.6	11.3	10.1	214
147	24.3	22.6	20.9	19.3	17.8	16.4	15.0	13.6	12.3	11.1	9.9	213
148	23.8	22.1	20.5	18.9	17.4	16.0	14.6	13.3	12.0	10.8	9.6	212
149	23.3	21.7	20.1	18.5	17.0	15.6	14.3	13.0	11.7	10.5	9.4	211
150	22.8	21.2	19.6	18.1	16.6	15.2	13.9	12.6	11.4	10.2	9.1	210
151	22.3	20.7	19.1	17.6	16.2	14.8	13.5	12.3	11.1	10.0	8.9	209
152	21.8	20.2	18.6	17.1	15.7	14.4	13.1	11.9	10.8	9.7	8.6	208
153	21.3	19.7	18.1	16.6	15.3	14.0	12.7	11.6	10.5	9.4	8.4	207
154	20.7	19.1	17.6	16.1	14.8	13.5	12.3	11.2	10.1	9.1	8.1	206
155	20.1	18.6	17.1	15.7	14.4	13.1	11.9	10.8	9.8	8.8	7.8	205
156	19.5	18.0	16.5	15.2	13.9	12.7	11.5	10.4	9.4	8.4	7.5	204
157	18.8	17.4	16.0	14.7	13.4	12.3	11.1	10.1	9.1	8.1	7.2	203
158	18.1	16.7	15.4	14.1	12.9	11.8	10.7	9.7	8.7	7.8	6.9	202
159	17.5	16.1	14.8	13.6	12.4	11.3	10.3	9.3	8.4	7.5	6.6	201
160	16.8	15.5	14.2	13.0	11.9	10.8	9.8	8.9	8.0	7.1	6.3	200
161	16.1	14.9	13.6	12.5	11.4	10.3	9.4	8.5	7.6	6.8	6.0	199
162	15.4	14.2	13.0	11.9	10.8	9.8	8.9	8.0	7.2	6.4	5.7	198
163	14.7	13.5	12.4	11.3	10.2	9.3	8.5	7.6	6.9	6.1	5.4	197
164	13.9	12.8	11.7	10.7	9.7	8.8	8.0	7.2	6.5	5.8	5.1	196
165	13.1	12.1	11.0	10.1	9.2	8.3	7.6	6.8	6.1	5.5	4.8	195
166	12.3	11.3	10.3	9.4	8.6	7.8	7.1	6.4	5.7	5.1	4.5	194
167	11.5	10.5	9.6	8.8	8.0	7.3	6.6	6.0	5.3	4.8	4.2	193
168	10.6	9.7	8.9	8.1	7.4	6.7	6.1	5.5	4.9	4.4	3.9	192
169	9.8	9.0	8.2	7.5	6.8	6.2	5.6	5.1	4.5	4.1	3.6	191
170	9.0	8.2	7.5	6.8	6.2	5.6	5.1	4.6	4.1	3.7	3.3	190
171	8.2	7.5	6.8	6.2	5.6	5.1	4.6	4.2	3.7	3.3	3.0	189
172	7.3	6.7	6.1	5.5	5.0	4.5	4.1	3.7	3.3	2.9	2.6	188
173	6.4	5.9	5.4	4.9	4.4	4.0	3.6	3.3	2.9	2.6	2.3	187
174	5.5	5.0	4.6	4.2	3.8	3.4	3.1	2.8	2.5	2.2	2.0	186
175	4.6	4.2	3.9	3.5	3.2	2.9	2.6	2.4	2.1	1.9	1.7	185
176	3.7	3.4	3.1	2.8	2.6	2.3	2.1	1.9	1.7	1.5	1.3	184
177	2.8	2.6	2.4	2.1	2.0	1.8	1.6	1.5	1.3	1.2	1.0	183
178	1.9	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.9	0.8	0.7	182
179	1.0	0.9	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	181
180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	180
a h	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	h a

a h	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	h a
°	°	°	°	°	°	°	°	°	°	°	°	°
135	+59.5	+59.2	+58.8	+58.3	+57.8	+57.4	+56.9	+56.4	+55.9	+55.3	+54.7	225
136	+59.8	+59.5	+59.1	+58.6	+58.1	+57.6	+57.1	+56.6	+56.0	+55.4	+54.8	224
137	+60.1	+59.8	+59.4	+58.9	+58.4	+57.9	+57.3	+56.8	+56.2	+55.6	+55.0	223
138	+60.4	+60.0	+59.6	+59.1	+58.6	+58.1	+57.5	+56.9	+56.3	+55.7	+55.1	222
139	+60.7	+60.3	+59.9	+59.4	+58.8	+58.3	+57.7	+57.1	+56.5	+55.9	+55.3	221
140	+61.0	+60.6	+60.1	+59.6	+59.0	+58.5	+57.9	+57.3	+56.7	+56.1	+55.4	220
141	+61.3	+60.9	+60.4	+59.9	+59.3	+58.7	+58.1	+57.5	+56.9	+56.3	+55.6	219
142	+61.6	+61.1	+60.6	+60.1	+59.5	+58.9	+58.3	+57.7	+57.0	+56.4	+55.7	218
143	+61.9	+61.4	+60.9	+60.3	+59.7	+59.1	+58.5	+57.9	+57.2	+56.5	+55.8	217
144	+62.2	+61.7	+61.1	+60.5	+59.9	+59.3	+58.6	+58.0	+57.3	+56.6	+55.9	216
145	+62.5	+62.0	+61.4	+60.8	+60.1	+59.5	+58.8	+58.2	+57.5	+56.8	+56.1	215
146	+62.8	+62.2	+61.6	+61.0	+60.3	+59.7	+59.0	+58.3	+57.6	+56.9	+56.2	214
147	+63.1	+62.5	+61.9	+61.2	+60.5	+59.9	+59.2	+58.5	+57.8	+57.1	+56.3	213
148	+63.4	+62.8	+62.1	+61.4	+60.7	+60.0	+59.3	+58.6	+57.9	+57.2	+56.4	212
149	+63.7	+63.1	+62.4	+61.7	+61.0	+60.3	+59.5	+58.8	+58.1	+57.3	+56.5	211
150	+63.9	+63.3	+62.6	+61.9	+61.2	+60.5	+59.7	+59.0	+58.2	+57.4	+56.6	210
151	+64.2	+63.5	+62.8	+62.1	+61.4	+60.7	+59.9	+59.1	+58.3	+57.5	+56.7	209
152	+64.4	+63.7	+63.0	+62.3	+61.5	+60.8	+60.0	+59.2	+58.4	+57.6	+56.8	208
153	+64.7	+64.0	+63.2	+62.5	+61.7	+61.0	+60.2	+59.4	+58.6	+57.8	+56.9	207
154	+64.9	+64.2	+63.4	+62.7	+61.9	+61.1	+60.3	+59.5	+58.7	+57.9	+57.0	206
155	+65.1	+64.4	+63.6	+62.9	+62.1	+61.3	+60.4	+59.6	+58.8	+58.0	+57.1	205
156	+65.3	+64.6	+63.8	+63.0	+62.2	+61.4	+60.5	+59.7	+58.8	+58.0	+57.1	204
157	+65.5	+64.8	+64.0	+63.2	+62.4	+61.6	+60.7	+59.8	+58.9	+58.1	+57.2	203
158	+65.7	+64.9	+64.1	+63.3	+62.5	+61.7	+60.8	+59.9	+59.0	+58.2	+57.3	202
159	+66.0	+65.2	+64.3	+63.5	+62.7	+61.8	+60.9	+60.0	+59.1	+58.3	+57.4	201
160	+66.2	+65.4	+64.5	+63.7	+62.8	+61.9	+61.0	+60.1	+59.2	+58.3	+57.4	200
161	+66.4	+65.6	+64.7	+63.8	+62.9	+62.0	+61.1	+60.2	+59.3	+58.4	+57.5	199
162	+66.5	+65.7	+64.8	+63.9	+63.0	+62.1	+61.2	+60.3	+59.4	+58.5	+57.6	198
163	+66.7	+65.9	+65.0	+64.1	+63.2	+62.3	+61.3	+60.4	+59.5	+58.6	+57.7	197
164	+66.9	+66.0	+65.1	+64.2	+63.3	+62.4	+61.4	+60.5	+59.6	+58.7	+57.8	196
165	+67.1	+66.2	+65.3	+64.4	+63.4	+62.5	+61.5	+60.6	+59.7	+58.8	+57.8	195
166	+67.2	+66.3	+65.4	+64.5	+63.5	+62.6	+61.6	+60.7	+59.7	+58.8	+57.8	194
167	+67.4	+66.5	+65.5	+64.6	+63.6	+62.7	+61.7	+60.8	+59.8	+58.9	+57.9	193
168	+67.5	+66.6	+65.6	+64.7	+63.7	+62.8	+61.8	+60.9	+59.9	+58.9	+57.9	192
169	+67.6	+66.7	+65.7	+64.8	+63.8	+62.9	+61.9	+61.0	+60.0	+59.0	+58.0	191
170	+67.7	+66.8	+65.8	+64.9	+63.9	+62.9	+61.9	+61.0	+60.0	+59.0	+58.0	190
171	+67.8	+66.9	+65.9	+65.0	+64.0	+63.0	+62.0	+61.1	+60.1	+59.1	+58.1	189
172	+67.9	+66.9	+65.9	+65.0	+64.0	+63.0	+62.0	+61.1	+60.1	+59.1	+58.1	188
173	+68.0	+67.0	+66.0	+65.1	+64.1	+63.1	+62.1	+61.1	+60.1	+59.2	+58.2	187
174	+68.0	+67.0	+66.0	+65.1	+64.1	+63.1	+62.1	+61.1	+60.1	+59.2	+58.2	186
175	+68.1	+67.1	+66.1	+65.1	+64.1	+63.2	+62.2	+61.2	+60.2	+59.2	+58.2	185
176	+68.1	+67.1	+66.1	+65.1	+64.1	+63.2	+62.2	+61.2	+60.2	+59.2	+58.2	184
177	+68.2	+67.2	+66.2	+65.2	+64.2	+63.2	+62.2	+61.2	+60.2	+59.2	+58.2	183
178	+68.2	+67.2	+66.2	+65.2	+64.2	+63.2	+62.2	+61.2	+60.2	+59.2	+58.2	182
179	+68.2	+67.2	+66.2	+65.2	+64.2	+63.2	+62.2	+61.2	+60.2	+59.2	+58.2	181
180	+68.2	+67.2	+66.2	+65.2	+64.2	+63.2	+62.2	+61.2	+60.2	+59.2	+58.2	180
a h	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	h a

a h	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	h a
°	°	°	°	°	°	°	°	°	°	°	°	°
135	12.3	10.9	9.6	8.2	6.9	5.7	4.5	3.3	2.2	1.1	0.0	225
136	12.1	10.7	9.4	8.1	6.8	5.6	4.4	3.2	2.1	1.0	0.0	224
137	11.9	10.6	9.3	8.0	6.7	5.5	4.4	3.2	2.1	1.0	0.0	223
138	11.7	10.4	9.1	7.8	6.6	5.4	4.3	3.2	2.1	1.0	0.0	222
139	11.5	10.2	8.9	7.7	6.5	5.3	4.2	3.1	2.1	1.0	0.0	221
140	11.3	10.0	8.7	7.5	6.3	5.2	4.1	3.0	2.0	1.0	0.0	220
141	11.1	9.8	8.6	7.4	6.2	5.1	4.1	3.0	2.0	1.0	0.0	219
142	10.9	9.6	8.4	7.2	6.1	5.0	4.0	2.9	1.9	0.9	0.0	218
143	10.7	9.5	8.3	7.1	6.0	4.9	3.9	2.9	1.9	0.9	0.0	217
144	10.5	9.3	8.1	6.9	5.8	4.8	3.8	2.8	1.8	0.9	0.0	216
145	10.3	9.1	8.0	6.8	5.7	4.7	3.7	2.7	1.8	0.9	0.0	215
146	10.1	8.9	7.8	6.7	5.6	4.6	3.6	2.6	1.7	0.8	0.0	214
147	9.9	8.7	7.6	6.5	5.5	4.5	3.5	2.6	1.7	0.8	0.0	213
148	9.6	8.5	7.4	6.3	5.3	4.3	3.4	2.5	1.6	0.8	0.0	212
149	9.4	8.3	7.2	6.2	5.2	4.2	3.3	2.5	1.6	0.8	0.0	211
150	9.1	8.0	7.0	6.0	5.0	4.1	3.2	2.4	1.6	0.8	0.0	210
151	8.9	7.8	6.8	5.8	4.9	4.0	3.1	2.3	1.6	0.8	0.0	209
152	8.6	7.6	6.6	5.6	4.7	3.8	3.0	2.2	1.5	0.7	0.0	208
153	8.4	7.4	6.4	5.5	4.6	3.7	2.9	2.2	1.5	0.7	0.0	207
154	8.1	7.1	6.2	5.3	4.4	3.6	2.8	2.1	1.4	0.7	0.0	206
155	7.8	6.9	6.0	5.1	4.3	3.5	2.8	2.1	1.4	0.7	0.0	205
156	7.5	6.6	5.7	4.9	4.1	3.4	2.7	2.0	1.3	0.7	0.0	204
157	7.2	6.4	5.5	4.7	4.0	3.3	2.6	1.9	1.3	0.7	0.0	203
158	6.9	6.1	5.3	4.5	3.8	3.1	2.5	1.8	1.2	0.6	0.0	202
159	6.6	5.8	5.1	4.3	3.7	3.0	2.4	1.8	1.2	0.6	0.0	201
160	6.3	5.5	4.8	4.1	3.5	2.9	2.3	1.7	1.1	0.5	0.0	200
161	6.0	5.3	4.6	3.9	3.4	2.8	2.2	1.6	1.1	0.5	0.0	199
162	5.7	5.0	4.3	3.7	3.2	2.6	2.1	1.5	1.0	0.5	0.0	198
163	5.4	4.8	4.1	3.6	3.0	2.5	2.0	1.4	1.0	0.5	0.0	197
164	5.1	4.5	3.9	3.4	2.8	2.3	1.8	1.3	0.9	0.4	0.0	196
165	4.8	4.3	3.7	3.2	2.7	2.2	1.7	1.3	0.9	0.4	0.0	195
166	4.5	4.0	3.5	3.0	2.5	2.0	1.6	1.2	0.8	0.4	0.0	194
167	4.2	3.7	3.3	2.8	2.3	1.9	1.5	1.1	0.7	0.4	0.0	193
168	3.9	3.4	3.0	2.5	2.1	1.7	1.3	1.0	0.6	0.3	0.0	192
169	3.6	3.2	2.8	2.3	2.0	1.6	1.2	0.9	0.6	0.3	0.0	191
170	3.3	2.9	2.5	2.1	1.8	1.4	1.1	0.8	0.5	0.2	0.0	190
171	3.0	2.6	2.3	1.9	1.6	1.3	1.0	0.7	0.5	0.2	0.0	189
172	2.6	2.3	2.0	1.7	1.4	1.1	0.9	0.6	0.4	0.2	0.0	188
173	2.3	2.0	1.8	1.5	1.3	1.0	0.8	0.6	0.4	0.2	0.0	187
174	2.0	1.7	1.5	1.3	1.1	0.9	0.7	0.5	0.3	0.1	0.0	186
175	1.7	1.4	1.3	1.1	0.9	0.8	0.6	0.4	0.3	0.1	0.0	185
176	1.3	1.1	1.0	0.8	0.7	0.6	0.4	0.3	0.2	0.1	0.0	184
177	1.0	0.9	0.8	0.6	0.6	0.5	0.3	0.2	0.2	0.1	0.0	183
178	0.7	0.6	0.5	0.4	0.4	0.3	0.2	0.1	0.1	0.0	0.0	182
179	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	181
180	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	180
a h	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	h a

h	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	h
°	°	°	°	°	°	°	°	°	°	°	°	°
135	+54.7	+54.1	+53.5	+52.9	+52.3	+51.7	+51.0	+50.3	+49.6	+48.9	+48.2	225
136	+54.8	+54.2	+53.6	+53.0	+52.3	+51.7	+51.0	+50.3	+49.6	+48.9	+48.2	224
137	+55.0	+54.4	+53.7	+53.1	+52.4	+51.8	+51.1	+50.4	+49.7	+49.0	+48.2	223
138	+55.1	+54.5	+53.8	+53.2	+52.5	+51.8	+51.1	+50.4	+49.7	+49.0	+48.2	222
139	+55.3	+54.6	+53.9	+53.3	+52.6	+51.9	+51.2	+50.5	+49.7	+49.0	+48.2	221
140	+55.4	+54.7	+54.0	+53.3	+52.6	+51.9	+51.2	+50.5	+49.7	+49.0	+48.2	220
141	+55.6	+54.9	+54.1	+53.4	+52.7	+52.0	+51.3	+50.6	+49.8	+49.0	+48.2	219
142	+55.7	+55.0	+54.2	+53.5	+52.8	+52.1	+51.3	+50.6	+49.8	+49.0	+48.2	218
143	+55.8	+55.1	+54.3	+53.6	+52.9	+52.2	+51.4	+50.6	+49.8	+49.0	+48.2	217
144	+55.9	+55.2	+54.4	+53.7	+52.9	+52.2	+51.4	+50.6	+49.8	+49.0	+48.2	216
145	+56.1	+55.3	+54.5	+53.8	+53.0	+52.3	+51.5	+50.7	+49.9	+49.1	+48.2	215
146	+56.2	+55.4	+54.6	+53.9	+53.1	+52.3	+51.5	+50.7	+49.9	+49.1	+48.2	214
147	+56.3	+55.5	+54.7	+54.0	+53.2	+52.4	+51.6	+50.8	+49.9	+49.1	+48.2	213
148	+56.4	+55.6	+54.8	+54.0	+53.2	+52.4	+51.6	+50.8	+49.9	+49.1	+48.2	212
149	+56.5	+55.7	+54.9	+54.1	+53.3	+52.5	+51.7	+50.9	+50.0	+49.1	+48.2	211
150	+56.6	+55.8	+54.9	+54.1	+53.3	+52.5	+51.7	+50.9	+50.0	+49.1	+48.2	210
151	+56.7	+55.9	+55.0	+54.2	+53.4	+52.6	+51.7	+50.9	+50.0	+49.1	+48.2	209
152	+56.8	+56.0	+55.1	+54.3	+53.4	+52.6	+51.7	+50.9	+50.0	+49.1	+48.2	208
153	+56.9	+56.1	+55.2	+54.4	+53.5	+52.7	+51.8	+50.9	+50.0	+49.1	+48.2	207
154	+57.0	+56.2	+55.3	+54.4	+53.5	+52.7	+51.8	+50.9	+50.0	+49.1	+48.2	206
155	+57.1	+56.3	+55.4	+54.5	+53.6	+52.7	+51.8	+50.9	+50.0	+49.1	+48.2	205
156	+57.1	+56.3	+55.4	+54.5	+53.6	+52.7	+51.8	+50.9	+50.0	+49.1	+48.2	204
157	+57.2	+56.4	+55.5	+54.6	+53.7	+52.8	+51.9	+51.0	+50.1	+49.2	+48.2	203
158	+57.3	+56.4	+55.5	+54.6	+53.7	+52.8	+51.9	+51.0	+50.1	+49.2	+48.2	202
159	+57.4	+56.5	+55.6	+54.7	+53.8	+52.9	+52.0	+51.1	+50.1	+49.2	+48.2	201
160	+57.4	+56.5	+55.6	+54.7	+53.8	+52.9	+52.0	+51.1	+50.1	+49.2	+48.2	200
161	+57.5	+56.6	+55.7	+54.8	+53.9	+53.0	+52.0	+51.1	+50.1	+49.2	+48.2	199
162	+57.6	+56.7	+55.7	+54.8	+53.9	+53.0	+52.0	+51.1	+50.1	+49.2	+48.2	198
163	+57.7	+56.8	+55.8	+54.9	+54.0	+53.1	+52.1	+51.1	+50.1	+49.2	+48.2	197
164	+57.7	+56.8	+55.8	+54.9	+54.0	+53.1	+52.1	+51.1	+50.1	+49.2	+48.2	196
165	+57.8	+56.9	+55.9	+55.0	+54.1	+53.2	+52.2	+51.2	+50.2	+49.2	+48.2	195
166	+57.8	+56.9	+55.9	+55.0	+54.1	+53.2	+52.2	+51.2	+50.2	+49.2	+48.2	194
167	+57.9	+57.0	+56.0	+55.1	+54.1	+53.2	+52.2	+51.2	+50.2	+49.2	+48.2	193
168	+57.9	+57.0	+56.0	+55.1	+54.1	+53.2	+52.2	+51.2	+50.2	+49.2	+48.2	192
169	+58.0	+57.1	+56.1	+55.1	+54.1	+53.2	+52.2	+51.2	+50.2	+49.2	+43.2	191
170	+58.0	+57.1	+56.1	+55.1	+54.1	+53.2	+52.2	+51.2	+50.2	+49.2	+48.2	190
171	+58.1	+57.1	+56.1	+55.1	+54.1	+53.2	+52.2	+51.2	+50.2	+49.2	+48.2	189
172	+58.1	+57.1	+56.1	+55.1	+54.1	+53.2	+52.2	+51.2	+50.2	+49.2	+48.2	188
173	+58.2	+57.2	+56.2	+55.2	+54.2	+53.2	+52.2	+51.2	+50.2	+49.2	+48.2	187
174	+58.2	+57.2	+56.2	+55.2	+54.2	+53.2	+52.2	+51.2	+50.2	+49.2	+48.2	186
175	+58.2	+57.2	+56.2	+55.2	+54.2	+53.2	+52.2	+51.2	+50.2	+49.2	+48.2	185
176	+58.2	+57.2	+56.0	+55.2	+54.2	+53.2	+52.2	+51.2	+50.2	+49.2	+48.2	184
177	+58.2	+57.2	+56.2	+55.2	+54.2	+53.2	+52.2	+51.2	+50.2	+49.2	+48.2	183
178	+58.2	+57.2	+56.2	+55.2	+54.2	+53.2	+52.2	+51.2	+50.2	+49.2	+48.2	182
179	+58.2	+57.2	+56.2	+55.2	+54.2	+53.2	+52.2	+51.2	+50.2	+49.2	+48.2	181
180	+58.2	+57.2	+56.2	+55.2	+54.2	+53.2	+52.2	+51.2	+50.2	+49.2	+48.2	180
h	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	90°	h

Correction
von
Rectascension und Declination
für eine Aenderung der Polhöhe um 1° ($d\varphi = + 1°$).

I. Correction in Rectascension. $\left(\frac{d\alpha}{d\varphi} = - \sin. s \ tg. \ \delta.\right)$

s	0° 180	10° 170	20° 160	30° 150	40° 140	50° 130	60° 120	70° 110	80° 100	90°	s
δ	°	°	°	°	°	°					δ
−30°	0.00	+0.10	+0.20	+0.29	+0.37	+0.44	°	°			−30°
−20	0.00	+0.06	+0.12	+0.18	+0.23	+0.28	+0.31	+0.34	°		−20
−10	0.00	+0.03	+0.06	+0.09	+0.12	+0.14	+0.16	+0.47	+0.18	°	−10
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
+10	0.00	−0.03	−0.06	−0.09	−0.12	−0.14	−0.16	−0.17	−0.18	−0.18	+10
+20	0.00	−0.06	−0.12	−0.18	−0.23	−0.28	−0.31	−0.34	−0.35	−0.36	+20
+30	0.00	−0.10	−0.20	−0.29	−0.37	−0.44	−0.50	−0.54	−0.56	−0.57	+30
+40	0.00	−0.14	−0.29	−0.42	−0.54	−0.65	−0.73	−0.79	−0.82	−0.84	+40
+50	0.00	−0.20	−0.40	−0.60	−0.76	−0.92	−1.04	−1.12	−1.17	−1.19	+50
+60	0.00	−0.29	−0.59	−0.87	−1.11	−1.33	−1.50	−1.63	−1.70	−1.73	+60
+70	0.00	−0.48	−0.93	−1.38	−1.76	−2.11	−2.39	−2.59	−2.70	−2.75	+70
+80	0.00	−0.96	−1.93	−2.84	−3.63	−4.37	−4.93	−5.33	−5.56	−5.67	+80
δ											δ
s	180° 0	190° 350	200° 340	210° 330	220° 320	230° 310	240° 300	250° 290	260° 280	270°	s

II. Correction in Declination. $\left(\frac{d\delta}{d\varphi} = \cos. \ s.\right)$

s	0°	10° 350	20° 340	30° 330	40° 320	50° 310	60° 300	70° 290	80° 280	90° 270	s
	° +1.00	° +0.98	° +0.94	° +0.87	° +0.77	° +0.64	° +0.50	° +0.34	° +0.17	° 0.00	
s	180°	170° 190	160° 200	150° 210	140° 220	130° 230	120° 240	110° 250	100° 260	90° 270	s

Befindet sich das Argument s (Stundenwinkel) unter der Tafel, so sind die Zahlen beider Tafeln mit entgegengesetztem Zeichen zu nehmen.

Inhalt.

Verbesserungen.

B. XX. Seite 109, Z. 17 v. u. lies blieben statt bleiben.

B. XVIII. » 30, vorletzte Zeile lies $11^s.97$ und $32^s.7$ statt $19^s.42$ und $33^s.6$.

B. XI. » 55, bei der Declination von Stern Nr. 25 lies 55′ 58.″0 statt 56′ 13.″3.

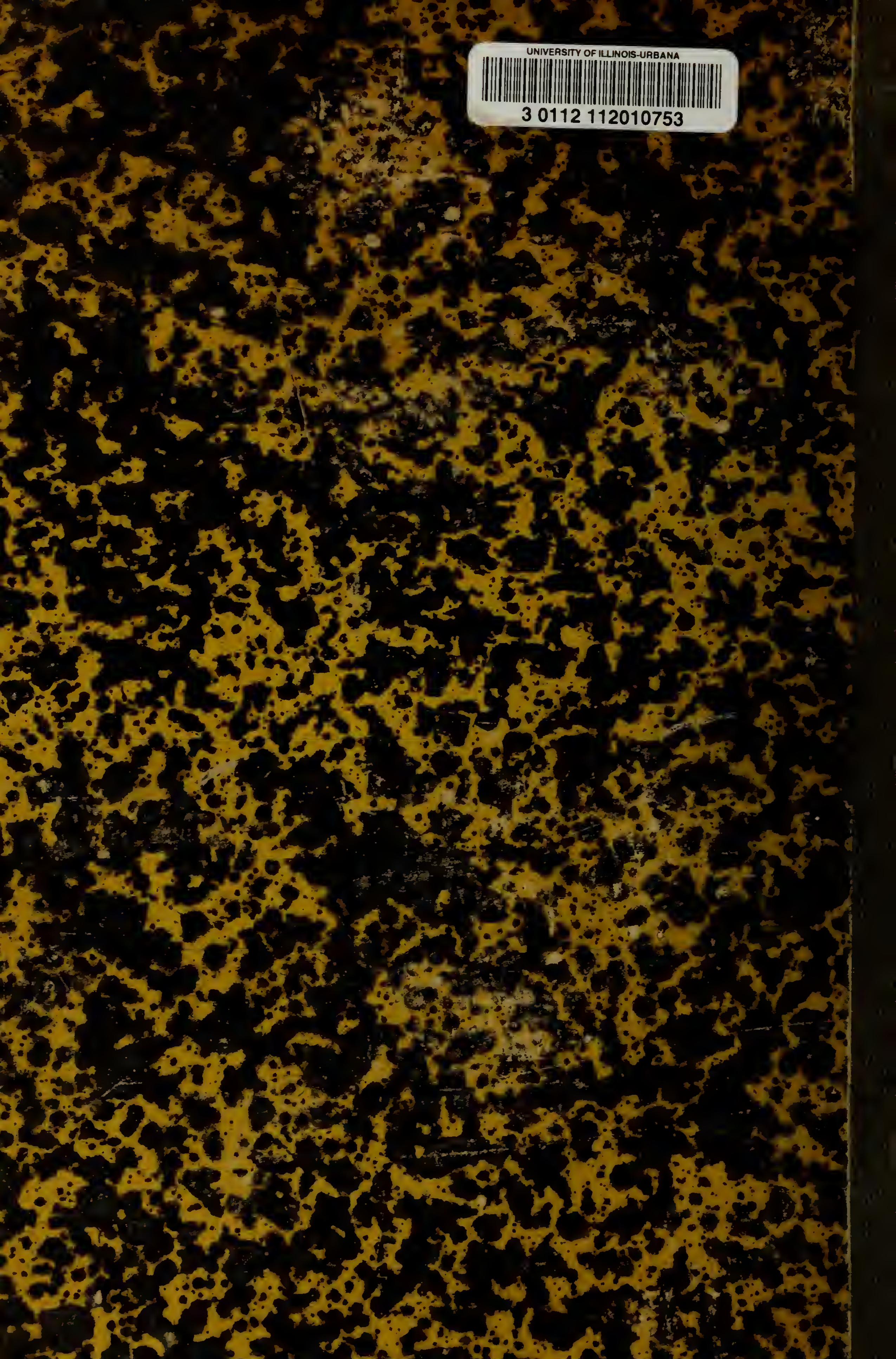
»	»	»	»	»	»	26	» 30.4	»	43.7.
»	»	»	»	»	»	27	» 3.8	»	16.8.
»	»	»	»	»	»	28	» 19.6	»	32.1.

B. IV. Bei der Beobachtung von Comet 1852 I am 21. Mai ist Seite 53 die Declination von Stern 1 um —15.″2; Seite 54 die Declination von Stern 2 um —13.″0, also die Declination des Cometen im Mittel um —14.″1 zu corrigiren. Bei der Beobachtung am 22. Mai (Seite 54) ist die Declination von Stern 1 um — 12.″5, die Declination von Stern 2 um —13.″3, also die Declination des Cometen im Mittel um —12.″9 zu corrigiren.









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